COMMONWEALTH MYCOLOGICAL INSTITUTE

C. A. B.
4 AUG 1953

REVIEW OF APPLIED MYCOLOGY

VOL. XXXII JULY 1953

LYON (A. G.) & HOWARD (H. W.). **Science and Watercress growing.**—*Agriculture, Lond.*, 59, 3, pp. 123–128, 2 pl., 1952.

The information in this paper referring to crook root disease of watercress caused by a plasmodiophoraceous fungus [*Spongospora* sp.: see preceding abstract] has already been noticed from another source [*R.A.M.*, 30, p. 354].

CRUICKSHANK (I. A. M.). **A note on the use of autoclaved pea-seed as a culture medium.**—*N.Z. J. Sci. Tech.*, Sect. B, 34, 4, p. 248, 1953.

At the Plant Diseases Division, Auckland, New Zealand, sporulation of the swede dry rot fungus (*Phoma lingam*) [*R.A.M.*, 29, p. 282] occurred on steamed pea seed under conditions of fluctuating temperature (4·4° to 21° C.) and light eight days after inoculation and was general and prolific on both steamed and autoclaved seed at 10 to 12 days; constant temperature and darkness were less favourable. On carrot and potato dextrose agars sporulation was belated and erratic and on other media did not occur. Autoclaved pea seed was used successfully in the preparation of spore suspensions of *P. lingam* for field trials, numerous highly pathogenic isolates being grown without decrease in sporulation. Cultured on the same medium, *Sphaerella linorum* [ibid., 30, p. 361] and *Polyspora lini* [loc. cit.; ibid., 27, p. 19] produced abundant spores, those of the former having long horns, as found in nature on flax straw.

LAWLOR (N.) & DOXTATOR (C. W.). **Breeding for resistance to root rot caused by Sclerotium rolfsii.**—*Proc. Amer. Soc. Sug. Beet Tech., 1950*, pp. 108–110, [? 1951. Received 1952.]

Breeding of sugar beet for resistance to *Sclerotium rolfsii* [cf. *R.A.M.*, 21, pp. 358, 399; 30, p. 447] was begun by the Beet Seed department of the American Crystal Sugar Company at Clarksburg, California, in 1946, when selections were made of surviving American 5 plants in 1946 and 1947 in localities where beets were dying of the disease. In 1949 a field known to be severely infested was used for tests of individual plant lines and of the bulk increase obtained in 1948. The results indicated differences in percentage survival between individual mother lines, between mother lines and the control variety, and between the mass selection 8-204 and the control variety under severe root rot conditions. Differences between the resistant selections and the parent variety were similar in both tests, and it is considered very unlikely that this result could be due to chance in both. The work is to be considerably expanded.

STEWART (D.). **Sugar Beet × Beta procumbens, the F_1 and backcross generations.**—*Proc. Amer. Soc. Sug. Beet Tech., 1950*, pp. 176–179, 4 figs., [? 1951. Received 1952.]

A brief account is given of hybridizations made at the Division of Sugar Plant

Investigations, U.S. Department of Agriculture, between sugar beet and *Beta procumbens*, which is immune or almost immune from a number of diseases affecting sugar beet. Together with other species of the section *Procumbentes* it is immune from leaf spot [*Cercospora beticola*: see following abstracts] and highly resistant to, if not immune from, curly top virus [*R.A.M.*, 29, p. 190]. The F_1 seedlings usually die, but the author was able to proceed as far as the second backcross progeny before the lines died out. The success obtained, though limited, encourages additional, more extensive work.

Brewbaker (H. E.), Bush (H. L.), & Wood (R. R.). **A quarter century of progress in Sugar Beet improvement by the Great Western Sugar Company.**—*Proc. Amer. Soc. Sug. Beet Tech., 1950*, pp. 202–207, 1 graph, [? 1951. Received 1952.]

In this progress report of sugar beet breeding in the United States by the Great Western Sugar Company, Longmont, Colorado, details are given of new varieties combining high resistance to *Cercospora beticola* [*R.A.M.*, 32, p. 228 and preceding and next abstracts] with superior root yield and sugar content. Two recent developments, GW 215 and C 304, have been thoroughly tested for three years. In one test (1949) at McCook, Nebraska, the yield of roots and total sugar, expressed as percentages of the figures for the susceptible commercial variety GW 59, and amount of leaf spot (0 = immune, 10 = complete necrosis, GW 59 = 6·7) were for the susceptible R & G 'N' 102, 100·5, and 8·5, respectively; whereas the corresponding figures for GW 215 were 114·7, 126·5 and 2; for C 304 115·3, 126·4, and 2·7; and for GW 248 114·6, 124·9, and 1·7. At least four of the new numbers were increased on a commercial scale for limited use by growers in 1950.

Coons (G. H.), Stewart (D.), Bockstahler (H. W.), Deming (G. W.), Gaskill (J. O.), Lill (J. G.), & Schneider (C. L.). **Report on 1949 tests of U.S. 216 × 225 and other varieties from Sugar Beet leaf spot resistance breeding investigations of the U.S. Department of Agriculture.**—*Proc. Amer. Soc. Sug. Beet Tech., 1950*, pp. 209–217, 1 fig., [? 1951. Received 1952.]

During agronomic evaluation tests of sugar beet varieties in 16 different localities in the United States in 1949 *Cercospora* leaf spot [*C. beticola*: see preceding abstracts] was sufficiently severe to allow readings of varietal resistance to be made at Fort Collins, Fort Morgan, and Sugar City in Colorado, at Mason City, Iowa, and at Stewart, Minnesota. In two tests in which the disease was a factor C 304 [loc. cit.] was significantly superior in yield of sugar per acre, but in leaf spot reading it was not essentially different from other resistant varieties tested. When leaf spot was not a factor Synthetic Check (S.P. 486-0) [*R.A.M.*, 24, p. 88] often performed as well as U.S. varieties or those developed by sugar beet companies. U.S. 226 [ibid., 28, p. 613], produced by intercrossing (in the F_1) eight strains resistant to leaf spot, has been taken as the standard for yield comparison. In an average of 16 tests in 1949 it was exceeded only by H-125 and 471802-00. In an average of all tests it was about 8 per cent. superior to Synthetic Check, exceeding it in sugar per acre in 12 out of 16 tests. The good performance of 471802-00, a synthetic variety made by combining six inbred lines, confirms the conclusion drawn from the behaviour of U.S. 226 that highly productive varieties made from many desirable inbred lines with good or moderate leaf spot resistance may, as a general rule, give greater returns than more resistant varieties of narrower genetic base, which are sometimes low in root yield. At Fort Collins (two tests), Ault, Longmont, and Fort Morgan, Colorado, C 304 gave significantly more sugar per acre than U.S. 226. In six tests in the humid area [ibid., 18, p. 566] H-125 from Michigan Experiment Station was significantly better than U.S. 226 at Latty, Ohio, though not significantly different elsewhere. Compared with U.S. 215 × 216/3 [ibid., 26,

p. 575], used as a local variety, it was significantly superior at Latty and at Chatham, Ontario, but not elsewhere. The variety 48B3-00, resistant to black root [*Aphanomyces cochlioides*: see next abstracts], descended from roots selected at Blissfield, Michigan, in 1947 [cf. loc. cit.] under conditions of severe infection, gave prevailingly good stands, as the disease was not serious. It displayed very definite resistance to leaf spot, the progenies involved deriving almost exclusively from resistant U.S. types. Special attention is called to this variety because of its performance under combined black root and leaf spot exposures at the Plant Industry Station, Beltsville, Maryland, and under severe black root conditions in Michigan and Minnesota.

Doxtator (C. W.), Downie (A. R.), Swink (J. F.), Ogden (D.), Bowman (R. L.), & Tanner (J. C.). **1948–1949 progress in breeding Sugar Beets for resistance to Aphanomyces root rot.**—*Proc. Amer. Soc. Sug. Beet Tech., 1950*, pp. 111–115, [? 1951. Received 1952.]

During 1948–9 the selection programme for sugar beets resistant to *Aphanomyces cochlioides* [*R.A.M.*, 30, p. 595] was extended to include North Dakota, the Red River Valley in Minnesota, and areas in northwestern Montana. Selections of American 3 Northern, American 3 Leaf Spot [*Cercospora beticola*] Resistant, and U.S. 33 were not resistant enough in these localities to withstand severe attacks, and hybrids of these selections with highly resistant American 1 selections are being made. A test at Mason City, Iowa, in 1949 of élite stocks from selections made each year since 1946 [cf. ibid., 28, p. 611] showed that the 1949 selection under medium severe root rot conditions gave a significantly higher yield than the 1946 (first) selection; 8-706X, 1949GH, and 7-609X, for example, yielded, respectively, 12·87, 13·32, and 12·88 tons of beets per acre compared with 8·88 for American 3 Northern. Under severe root rot conditions in the Red River Valley, seed from roots selected in 1948 from American 1RR at Waseca, Minnesota [see preceding abstract], yielded 14·01 tons of beets per acre, as compared with 5·49 for the commercial variety American 3LSR.

Hildebrand (A. A.), McKeen (W. E.), & Koch (L. W.). **Continued greenhouse experiments in row treatment of soil for control of blackroot of Sugar Beet seedlings.**—*Proc. Amer. Soc. Sug. Beet Tech., 1950*, pp. 509–514, [?1951. Received 1952.]

In greenhouse tests at Harrow, Ontario, on the control of black root of sugar-beet seedlings in naturally infested soil, the primary pathogen involved being *Aphanomyces cochlioides* [*R.A.M.*, 28, p. 556 and preceding abstracts], using U.S. 215×216 seed, row applications of arasan at the rate of 4 lb. per acre gave (averages of three experiments) 88·5 per cent. emergence, 7·6 per cent. black root, and 19·5 plants per foot final stand, while the corresponding figures for ceresan M (1 lb.) were 90·4, 14·1, and 17·9, and at 2 lb. 89·8, 10·2, and 19·1, as against 59·3, 44·1, and 8 for the untreated. Borax, which preliminary tests had shown to be exerting a modifying effect on black root gave (at 5 lb. per acre), 100·8 per cent. emergence, 19·9 per cent. black root, and 19·4 plants per foot; arasan (4 lb.) gave 112·9, 3·9, and 24·7; and the untreated 75·1, 42·4, and 9·9. The borax-treated seedlings were the most vigorous. For a mixture of 3 lb. arasan+4 lb. borax the figures were 165·6, 11·3, and 34·1, as against 156·8, 10·6, and 12·1 for arasan (3 lb.) alone, 141·9, 38·6, and 20·9 for borax (5 lb.) alone, and 93·9, 65·4, and 7·7 for the untreated. Treatments with 4 lb. borax gave inferior results and increasing the arasan was not beneficial. D-419 (another thiram-containing compound) at 2 lb. gave 102 per cent. emergence, 13·8 per cent. black root, and 22·1 plants per foot final seedling stand, the corresponding figures for arasan (4 lb.) being 99·3, 8·5, and 21·7, and for the controls 49·9, 45·6, and 6·4. At 4 lb. D-419 reduced germination and induced

toxic effects in the seedlings. The results obtained with ceresan M and borax warrant field trials. D-419 equalled arasan in effectiveness and in some respects was preferable.

KEPNER (R. A.) & LEACH (L. D.). **A continuous spray-type seed treater.**—*Proc. Amer. Soc. Sug. Beet Tech., 1950*, pp. 54–60, 1 fig., 1 diag., [? 1951. Received 1952.]

The information in this paper has already been noticed from another source [*R.A.M.*, 29, p. 268].

KLOOR (L. A.). **Experiences in the practical use of a continuous spray treater.**—*Proc. Amer. Soc. Sug. Beet Tech., 1950*, pp. 61–68, 3 figs., [? 1951. Received 1952.]

In this account of sugar beet seed treatments at the Holly Sugar Corporation, Stockton, California, with the commercial model of Kepner and Leach's continuous seed treater [see preceding abstract] the author states that he uses phygon XL wettable powder [*R.A.M.*, 28, pp. 471, 612] with 75 per cent. lindane as a wireworm repellant. Applied at the rate of 2 qts. per cwt. seed the mixture gives dosage applications of 0·25 per cent. phygon and 0·33 lindane. Nozzle erosion was corrected by using hardened stainless steel nozzle tips, 43,500 lb. of seed being treated with a single tip. Numerous greenhouse germination trials with treated seed showed that most of the spray-treated samples gave significantly higher stands than untreated seeds in *Pythium*-infested soils. In general, there were no significant differences in emergence and survival between carefully dusted and spray-treated seeds.

LAMBDIN (R. S.). **Three years' experience with batch spray treating of Beet seed.**—*Proc. Amer. Soc. Sug. Beet Tech., 1950*, pp. 69–71, 2 figs., [? 1951. Received 1952.]

The batch spray treater used by the Spreckels Sugar Company at Spreckels, California, for the treatment of sugar beet seed [see preceding abstract] has been modified by the addition of one nozzle to the spray manifold and by the use of a compressed air supply instead of a pump to maintain the desired pressure of spray liquid. Phygon 'micronized' paste (55 per cent. active ingredient) can readily be maintained in suspension by using an agitator in the storage tank. Owing to its small particle size this material permits the use of smaller nozzle orifices, which gives a longer spraying period with improved coverage. A mixture of 1 part phygon 'micronized' paste to 20 parts water is applied at the rate of 1 qt. per 50 lb. seed with very satisfactory results.

BRASFIELD (T. W.) & TATE (H. D.). **Phygon seed protectant for Sugar Beets.**—*Proc. Amer. Soc. Sug. Beet Tech., 1950*, pp. 72–75, [? 1951. Received 1952.]

Tabulated results of tests over a number of years at the U.S. Rubber Company, Naugatuck, Connecticut, with phygon for the treatment of sugar beet seed [see preceding abstracts] are presented. They show that it improves germination, prevents post-emergence damping-off, is non-injurious to the seed, and increases stands. For average conditions the treatments recommended are: phygon seed protectant 4 oz. per 100 lb. seed and phygon paste 1 pt. per 600 lb. seed.

VOGELSANG (P.). **New techniques in seed pelleting.**—*Proc. Amer. Soc. Sug. Beet Tech., 1950*, pp. 76–78, [? 1951. Received 1952.]

Processed Seeds, Inc., Midland, Michigan, a concern engaged in the commercial production of pelleted or coated seeds [see next abstract] for general agricultural use, carried out extensive research for five years to determine what coating materials,

sticker solutions, etc., were most suitable for the various seed types while permitting free absorption of soil moisture. The study also included tests of ingredients to assist in protecting the seed from [unspecified] rot under abnormal conditions and the seedlings from pre- and post-emergence damping-off and to stimulate growth.

Preliminary investigations on certain antibiotics, including actidione [*R.A.M.*, 32, p. 204], have given promising results, the concentration required being low and application easy. A standard sugar beet seed pellet is being made in the Middle West which contains arasan at 10 per cent. of the seed weight, this amount being necessary to ensure maximum emergence and to control seed rot in the wet, cold conditions that usually prevail locally; under warmer conditions 4 or 5 per cent. affords adequate protection. An adequate stand is obtained with 7 or 8 lb. pellets per acre.

Burgesser (F. W.). **The use of coated seed in modern agriculture.**—*Proc. Amer. Soc. Sug. Beet Tech., 1950*, pp. 79–84, [? 1951. Received 1952.]

After defining a 'coated' seed [see preceding abstract] as one coated with an inert material, primarily to increase its size and so facilitate planting, and reviewing recent research on seed coating in the United States, the author states that the use of toxins, such as fungicides, has a definite place in the process. The coating developed is 80 per cent. as effective as most fungicides, and alone would afford protection that would probably ensure a stand under any but the most unfavourable conditions. To obtain fuller protection, however, and to meet the worst conditions fungicides can be added without injury to the seed. Organic materials can be applied in much larger doses when combined with the coating than when used on uncoated seed.

Murav'ev (V. A.). Влияние степени зрелости Сахарной Свекли на устойчивость корней против гниения. [Influence of the degree of maturity of Sugar Beets on the resistance of roots to rot.]—Сахар. Пром. [*Sug. Ind., Moscow*], *1952*, 1, pp. 41–43, 1952.

Experiments were carried out at the Pan-Soviet Sugar Beet Scientific Research Institute to determine the influence of the degree of maturity on the resistance of sugar beets to rot caused by *Botrytis* [*cinerea*: *R.A.M.*, 20, p. 332]. One field plot was sown on 22nd April [? 1951] and two on 22nd May. On 17th August and again on 10th October pieces were cut from the roots *in situ* with a special knife and grown on Koch's agar medium with cultures of *B. cinerea*. The amount of rot induced increased with the growth of the plant. Thus, increasing the number of days' growth on the early sown plot from 117 (for early harvest) to 172 (late) and on the two late sown plots from 87 (early) to 142 (late) increased infection by 15 and 17 per cent., respectively. Late sowing decreased it.

Therefore, as the plant matures root resistance decreases, young beets being less susceptible than older ones irrespective of the date of sowing or harvesting.

De Menezes (O. B.). **Identificação de 4 raças fisiológicas da ferrugem do Feijoeiro (nota preliminar).** [Identification of four physiologic races of Bean rust (preliminary note).]—*Dusenia*, 3, 4, pp. 309–312, 1952. [English summary.]

Rust (*Uromyces phaseoli typica*) [*U. appendiculatus*] is stated to be a major problem on beans [*Phaseolus vulgaris*] in the Baixada Fluminense region of Brazil. From field ratings on seven differential varieties, pustule development being graded according to the scale proposed by Harter *et al.* [*R.A.M.*, 20, p. 555], physiologic races 1, 4 [ibid., 31, p. 467], 7, and 12 appear to be present locally.

Warid (W. A.) & Plakidas (A. G.). **Thermophilic viruses naturally infectious to Cowpea.**—*Plant Dis. Reptr*, 36, 10, pp. 380–381, 1952. [Multilithed.]

In experiments at the Department of Botany, Louisiana State University, Baton Rouge, to determine the thermal inactivation points of four single viruses and three virus complexes from cowpea (abs. in *Phytopathology*, 40, pp. 30–31, 1950) infective sap was diluted with an equal volume of distilled water and exposed for 10 minutes to the test temperature. *Vigna* viruses (V.V.)2 and 3A were inactivated at 98° to 100° C.; V.V.3, C(omplex) 2, and C.3 between 100° and 104°; and V.V.1 between 104° and 108°; while C.1 was still infectious after exposure to 108° [cf. *R.A.M.*, 31, p. 608].

Hildebrand (A. A.) & Koch (L. W.). **Observations on a root and stem rot of Soybeans new to Ontario, caused by Pythium ultimum Trow.**—*Sci. Agric.*, 32, 11, pp. 574–580, 2 pl., 1952.

Pythium ultimum was identified as the fungus responsible for stem and root rot of soy-beans, first observed in July, 1951, in Essex and Kent counties of south-western Ontario. The disease, which attacks plants singly or in groups, is characterized by dwarfing and wilting with a greyish- or sometimes reddish-brown stem discoloration from ground level upwards, covered with a visible fungus growth. Roots of severely affected plants are badly disintegrated, only the main root usually remaining. Infection is believed to take place at or about soil-level.

In isolation experiments 84 per cent. of the tissue plantings from 15 different stems yielded apparently identical cultures of *P. ultimum* [cf. *R.A.M.*, 25, p. 431]. In greenhouse soil inoculation experiments with two isolates of the fungus on the Lincoln and Hawkeye varieties not a single healthy seedling appeared in the eight flats of infested soil, compared with almost a 100 per cent. production of healthy plants in non-infested steamed soil. The disease is favoured by low soil temperature, though in heavily infested soil it can destroy the seed over a wide range of temperature (11° to 22° C.). It can best be prevented by a crop rotation programme.

Patel (M. K.) & Diwan (N. D.). **Bacterial blight of Cowpea.**—*Indian Phytopath.*, 3, 1, pp. 75–80, 2 figs., 1950. [Received March, 1953.]

This is a full account of *Xanthomonas vignicola* [*R.A.M.*, 32, p. 238] on cowpea, a shorter version of which has already been noticed from another source [ibid., 29, p. 406].

Patel (M. K.), Kulkarni (Y. S.), & Dhande (G. W.). **Bacterial leaf-spot of Chillies.**—*Indian Phytopath.*, 3, 1, pp. 95–97, 1950. [Received March, 1953.]

Bacterial leaf spot of chilli (*Xanthomonas vesicatoria*) [*R.A.M.*, 29, p. 406; 32, p. 238] developed on seedlings grown from seeds obtained from an inoculated giant chilli plant. The treatment of suspected seed with 1:1,000 mercuric chloride for 2 to 5 minutes is recommended. The bacterium readily infected chilli leaves, unripe, wounded fruits, and tomato. It is inferred that the disease was introduced into India on seeds.

Jones (A. P.). **'Parsnip canker'.**—*Nature, Lond.*, 171, 4352, p. 574, 1953.

Investigations in the Department of Agriculture, Leeds University, for several seasons have demonstrated that symptoms of parsnip canker and scab [*R.A.M.*, 30, p. 94] can be produced by *Streptomyces* [*Actinomyces*] *scabies*, the cultures used being obtained from potato and beet in Great Britain and the United States. Millard and Burr's strain 17 [ibid., 6, p. 179] formed lesions on potato, beet, mangold, radish, carrot, and parsnip. The lesions arose in lenticels and were raised at

first on parsnip. Potato scabs and parsnip cankers were very similar in structure except that the cankers usually formed only one protective cork barrier.

Several isolates obtained in one season from carrot and parsnip lesions and agreeing culturally and morphologically with the infecting cultures caused canker-ing of parsnips in a later season. Similar strains are probably capable, therefore, of causing the commonest form of parsnip canker in nature.

Wager (V. A.). **Leaf-spot disease of Celery.**—*Fmg in S. Afr.*, 27, 315, pp. 335–336, 2 figs., 1952.

Leaf spot of celery (*Septoria apii-graveolentis*) [cf. *R.A.M.*, 4, p. 261] causes severe damage to celery annually [? in Natal]. It is important not to grow this crop on the same land for two consecutive seasons. All dead leaves should be burned or ploughed in deeply.

Steeping in cold water for an hour and in hot water (118° F.) for 30 minutes followed by a short cold soak is recommended for killing the fungus in the seed. In Durban the disease has been controlled [ibid., 31, p. 444; 32, p. 58], even when severe, by spraying with 8–4–100 Bordeaux mixture plus spreader twice a week for two weeks and once a week thereafter at the rate of about 300 gals. per morgen [1 morgen = 2·17 acres]. Copper-lime dust applied in the early morning at the rate of 50 to 70 lb. per morgen is equally efficient. The importance of using clean or sterilized seed cannot be emphasized too strongly.

Thompson (R. C.). **Lettuce varieties and culture.**—*Fmrs' Bull. U.S. Dep. Agric.* 1953, 42 pp., 13 figs., 1951. [Received March, 1953.]

In this bulletin, a revision of that published in 1944 [cf. *R.A.M.*, 24, p. 2], notes are given on the symptoms, cause, and control of the virus diseases big vein [ibid., 30, p. 211 and next abstract] and mosaic [ibid., 31, p. 164; cf. 32, p. 230] in addition to those dealt with previously. The varieties New York 515, Imperial 456 (Cornell 456), and Great Lakes are resistant to tipburn [ibid., 32, p. 167] and Pennlake partially so.

Fry (P. R.). **Note on occurrence of a Tobacco-necrosis virus in roots of Lettuce showing big-vein.**—*N.Z. J. Sci. Tech.*, Sect. A, 34, 2, pp. 224–225, 1 fig., 1952.

A survey of nine winter lettuce crops in the Auckland district of New Zealand showed that lettuce big vein virus [see preceding abstract] infected eight of them. Inoculation with root sap from lettuces showing big vein and from symptomless plants in affected crops produced local lesions on Sydney Wonder French bean [*Phaseolus vulgaris*], sap from infected beans producing necrotic, local lesions on White Burley tobacco, *Nicotiana glutinosa*, and cucumber. Inactivation of infective bean sap occurred in ten minutes between 94° and 96° C. [cf. *R.A.M.*, 28, p. 109]. From these characteristics it is concluded that the virus recovered from lettuce roots belongs to the tobacco necrosis group [cf. ibid., 18, p. 211; 29, p. 539].

Anderson (C. W.). **The distribution of cucurbit viruses in central Florida.**—*Plant Dis. Reptr*, 36, 10, pp. 377–379, 1952. [Multilithed.]

In a survey of cucurbit viruses in central Florida [*R.A.M.*, 31, p. 166] species of *Melothria* were found to be hosts of watermelon mosaic virus [ibid., 31, pp. 368, 542]. Though not occurring in all diseased areas, infected *Melothria* was particularly common where cucurbit infection was most prevalent. The apparent association of watermelon mosaic with Yellow Summer Crookneck squash and cucumber mosaic with cucumber may be explained by the differences in distribution of the two viruses and of their *Melothria* and *Commelina* hosts, coupled with the fact that different farming areas specialize in different cucurbits; furthermore, watermelon mosaic symptoms on green-fruited cucurbits are frequently overlooked.

McKeen (C. D.). **Aphanomyces cladogamus Drech., a cause of damping-off in Peppers and certain other vegetables.**—*Canad. J. Bot.*, 30, 6, pp. 701–709, 3 pl., 1952.

Aphanomyces cladogamus [*R.A.M.*, 32, p. 293] was isolated from up to 8 per cent. of damped-off [chilli] pepper seedlings [ibid., 25, p. 150; 27, p. 10] raised in sandy loam compost under glass in Ontario. The pre- and post-emergence phases of the disease reduced stands by up to 40 and 50 per cent., respectively, when chilli seeds were sown in inoculated soil. Characteristic symptoms of post-emergence attack were black lesions on the hypocotyl frequently extending to the bases of the cotyledons; most of the affected seedlings died.

In pathogenicity tests *A. cochlioides* was considerably more pathogenic to sugar beets [see above, p. 355] than *A. cladogamus*, while the latter was more pathogenic to chillis, though it reduced the stand only slightly more than it did to sugar beets. *A. cladogamus* was unable to cause as much damping-off in chillis as *Rhizoctonia* [*Corticium*] *solani* or *Pythium ultimum*. Its effect was considerable on tomato, eggplant, radish, and spinach [ibid., 22, p. 373]; it attacked Spanish onions only slightly, and lettuce, pea, and muskmelon not at all. Except in spinach the fungus showed little tendency to colonize the root tissues, whereas hypocotyl and cotyledonary tissues were highly susceptible.

What is new in vegetables.—*Seed World*, 72, 2, pp. 8, 10, 46, 3 figs., 1953.

Kopiah, a new tomato variety resistant to *Fusarium* [*bulbigenum* var. *lycopersici*: *R.A.M.*, 32, pp. 154, 285] has been developed at the Mississippi Branch Experiment Station, Crystal Springs. Its parentage includes *Lycopersicum pimpinellifolium*, Rutgers, and Early Rutgers.

Two new muskmelon varieties well adapted for the south have been developed recently. Georgia 47 [ibid., 31, p. 362], selected at the Georgia Experiment Station, Experiment, from a cross between Hearts of Gold and a resistant wild strain from foreign plant introductions of the United States Department of Agriculture, is resistant to powdery mildew [*Erysiphe cichoracearum*: ibid., 32, p. 169], while Rio Sweet from the Branch Experiment Station, Weslaco, Texas, a hybrid between a wild melon resistant to downy mildew [*Pseudoperonospora cubensis*: ibid., 31, p. 362; 32, p. 299], Hale Best, and Smith Perfect, is resistant to downy mildew but somewhat susceptible to *E. cichoracearum*. Another new muskmelon variety resistant to *Fusarium* [*bulbigenum* var. *niveum*: ibid., 31, p. 473], Delicious 51, obtained from a cross between Harris' Delicious and Iroquois, is reported as adaptable to the north. The new watermelon variety, Fairfax, developed by the U.S.D.A. at Charleston, South Carolina, from crosses between Congo, Leesburg, Hawkesbury, and Garrison, combines resistance to anthracnose [*Colletotrichum lagenarium*: ibid., 31, p. 542], *Fusarium* wilt, and *Alternaria* [*cucumerina*: ibid., 29, p. 75].

A new pickling cucumber, Wisconsin SR 6, resistant to scab [*Cladosporium cucumerinum*: ibid., 31, p. 290] is reported from the University of Wisconsin.

Dawson (H.). **Heating systems.**—*M.G.A. Bull., 1952*, 32, pp. 227–243, 1952.

Following a general survey of house heating in mushroom growing and a discussion of the various methods and techniques for controlled heating and ventilation [*R.A.M.*, 32, p. 59], other papers deal with more specific aspects of the subject including electrical space heating by A. E. Canham (pp. 231–232), atmospheric control by C. V. Ward (pp. 232–233), radiant heat by F. Allnutt (p. 234), air conditioning by E. J. Batten (pp. 235–238), low pressure steam heating by C. H. Fawcett (pp. 239–241), and hot water heating by J. L. Kinnel (pp. 241–244).

Sarejanni (J. A.). **Quelques problèmes de l'épidémiologie du mildiou de la Vigne en Grèce.** [Some problems of the epidemiology of Vine mildew in Greece.]—*Ann. Inst. phytopath. Benaki*, 5, 2, pp. 53–64, 1951. [Received 1952.]

Every year vine downy mildew (*Plasmopara viticola*) [C.M.I. map No. 221] threatens the wettest areas of Greece, such as Thessaly and Drama, Macedonia, the irrigated vineyards around Chalcis on the isle of Euboea, and certain coastal areas subject to night dews near the mouths of rivers in northern Peloponnese. In most other vine-growing areas, however, mildew is serious only in years when conditions are favourable, generally according to Capus's principles [*R.A.M.*, 10, p. 581]. The absence or only rare occurrence of the disease in some areas, chiefly in the south, is attributed to the high light intensity and dry weather unfavourable to the dissemination and germination of the sporangia.

Although in areas south of the 38th parallel, such as Kiphissia, successive generations of sporangia are produced throughout a mild winter, they are prevented from damaging the vines if all the green parts are pruned before bud-burst. They are, however, an important source of inoculum in untended vineyards.

In southern Greece, at least, the development of large numbers of oospores in the autumn occurs only when rain falls early and at regular intervals during autumn, and the onset of cold weather is delayed. The author's observations in this region indicated that a downy mildew year can follow only after such conditions, the build-up of sufficient inoculum during the spring being unlikely since the weather soon becomes dry with the temperature exceeding 30°[c.], the maximum for mildew development. In a year following such an autumn, treatment would be advisable. The establishment of a warning service employing trained inspectors is recommended, so that growers may be advised by March whether or not it is necessary to spray. Only two inspections would be required, in mid-October and mid-November in selected localities where conditions are particularly favourable for infection.

The author discusses the possibility of establishing a control programme having regard to the various local climatic conditions, which would probably demand different treatment.

Gaudineau (M[arguerite]), Messiaen (C. M.), Lafon (R.), & Simone (J.). **Mildiou de la Vigne : efficacité des produits de lutte en 1951.** [Vine mildew: effectiveness of control materials in 1951.]—*C.R. Acad. Agric. Fr.*, 39, 12, pp. 441–442, 1952.

For the first time for several years conditions at Grande Ferrade, France, in 1951 favoured the development of vine mildew [*Plasmopara viticola*: *R.A.M.*, 32, p. 9]. Copper oxychloride and copper oxides were tested in comparison with 2, 1, and 0·5 per cent. Bordeaux mixture. Organic materials [loc. cit. and next abstracts] were also tried on a limited scale, but proved expensive and less adherent than Bordeaux. After seven sprays applied between 7th May and 2nd August the best of all the test materials gave results intermediate between those for 2 and 1 per cent. Bordeaux.

From these experiments and observations in the vineyards of Graves, Sauterne, and Médoc it is concluded that frequent treatments from blossoming to fruit set with relatively inferior products such as synthetic organics increase their efficiency but send up labour costs. Bordeaux mixture, therefore, is still the most profitable and economical vine protectant.

Magnani (G.), Ciccarone (A.), & Sibilia (C.). **Prove preliminari di lotta antiperonosporica con preparati organici.** [Preliminary tests on the control of

Peronospora with organic preparations.]—*Boll. Staz. Pat. veg. Roma*, Ser. 3, 7 (*1949*), pp. 159–166, 1 graph, 1951. [English summary.]

In a comparative test carried out near Rome vines were sprayed seven times against mildew (*Plasmopara viticola*) [*R.A.M.*, 28, pp. 376, 617, and preceding and next abstracts] from 9th May to 4th July, 1950, with 1 per cent. Bordeaux mixture, 0·33 per cent. fermate, and parzate (0·22 per cent. for the first five applications, then 0·3 per cent.). The numbers of infected leaves on 30th July were 42, 51, and 27 for the three treatments, respectively. In September infection unexpectedly reappeared after having been checked by dry weather in July and August and induced premature defoliation on the vines treated with fermate and parzate (especially the former) because of the absence of copper, though those treated with Bordeaux retained their leaves until the end of November. The average sugar content was 17·97 [? per cent.] for Bordeaux, 17·93 for parzate, and 15·84 for fermate, and the total yields were 17·52, 18·98, and 11·03 quintals, respectively.

To prevent defoliation Bordeaux should be used for the final application.

Pieri (G.). **Nuovi anticrittogamici sperimentati nel 1951.** [New fungicides tested in 1951.]—*Ann. Sper. agr.*, N.S., 6, 4, pp. 1027–1042, 1952. [English summary.]

In spraying and dusting trials on vines at the Experiment Station, Conegliano, Italy, in 1951 a number of new materials containing little or no copper were compared with Bordeaux mixture with or without wetter-adhesives for the control of *Plasmopara viticola* [see preceding abstracts]. Against *Uncinula necator* [*R.A.M.*, 28, pp. 376, 617] materials containing wettable colloidal sulphur were compared with ventilated sulphur. Among those which gave the best results solframe (copper sulphate 12·5 per cent., sulphur 35 to 36 per cent., wetter-adhesives and spreading agents 14 to 15 per cent.) was as effective against both diseases as 1 per cent. Bordeaux and ventilated sulphur. Against *P. viticola* only 0·5 per cent. Bordeaux mixture plus 0·1 per cent. emulsol or sandovit gave almost as good control as 1 per cent. Bordeaux alone. Zerlate and fermate were inferior to 1 per cent. Bordeaux against *P. viticola* and gave no control of *U. necator*.

Cosan [ibid., 24, p. 424, *et passim*] at 0·15 per cent. completely controlled *U. necator* and caused no burning; even at a low concentration it had a strong and persistent effect against the disease. The wettable colloidal sulphurs tiomicron (used in an aqueous suspension at 0·5 per cent. or mixed with 1 per cent. Bordeaux at the rate of 0·5 per cent.), tiosol (60 per cent. activated sulphur), and ultrasolfo (0·6 per cent.) all proved as effective against *U. necator* as plain ventilated sulphur.

It is concluded that weak Bordeaux mixtures with added spreader-adhesives can be recommended against *P. viticola* and that wettable sulphurs are at least as effective as ventilated sulphurs against *U. necator*.

Du Plessis (S. J.). **Vine nurseries.**—*Fmg in S. Afr.*, 27, 317, pp. 378, 390, 1952.

The author recapitulates the regulations governing vine propagation and nursery maintenance in South Africa on farms infected with bacterial blight [*Erwinia vitivora*: *R.A.M.*, 26, p. 332; 31, p. 473], those adjoining infected properties, and those remote from them. For the last it is emphasized that no registration will be granted unless the application reaches the Department of Agriculture before 31st January during the current grafting season. Furthermore, no nursery will be certified unless the grafting material has been obtained from vineyards on the farm itself or from those which have been registered and certified prior to the date on which the propagating material was obtained.

Wilhelm (A. F.). **Bormangel bei der Weinrebe Vitis vinifera L. Krankheitsbild, Verbreitung und Versuche zur Behebung von Bormangel in Weinbergen.** [Boron deficiency in the Vine, *Vitis vinifera* L. Symptomatology and distribution of, and remedial experiments for boron deficiency in vineyards.]—*Phytopath. Z.*, 19, 2, pp. 129–159, 19 figs., 2 graphs, 1952.

Heavy losses in the vineyards of Baden, Germany, have been shown by several years' experiments to be due to boron deficiency [*R.A.M.*, 16, p. 585; 28, p. 112]. Symptoms of the disorder include double eyes, dying-off of the growing points, and partial or total abortion of the flower cushions. Sylvaner, Müller-Thurgau, Neuburger, and White Burgundy appear to be the most susceptible varieties, while Riesling, Traminer, Ruländer, Blue Burgundy, Gutedel, Muskateller, Portuguese, and Ortlieber are less frequently and severely affected. The results of pot experiments, in which uniform quantities of boron were applied to various soil types, showed that the capacity of tephritic soils for fixing boron greatly exceeds that of loess, humus sand, or sandy peat.

Reasons are adduced for the belief that flower abortion and proliferation is frequently attributable to an insufficient supply of boron, even though no other deficiency symptoms may be apparent. Attention is also drawn to the external analogies between boron deficiency and court-noué [ibid., 30, pp. 261, 303, 403, *et passim*], suggesting the desirability of an investigation of affected vineyards from the nutritional standpoint. On the basis of experience accumulated to date in Baden, obvious symptoms of boron deficiency appear to be remediable by borax amendments of 2 kg. per are [119·6 sq. yds.] for heavy and highly calcareous soils and 1 kg. for lighter ones.

Pupillo (M.). **'Melanosi fisiologica' della Vite.** ['Physiological melanosis' of the Vine.]—*Ann. Sper. agr.*, N.S., 6, 3, pp. 785–791, 5 figs., 1952. [English summary.]

Vines near Bologna and Reggiano, Italy, suffer from a 'physiological melanosis' resembling true melanosis (*Septoria ampelina*) [*R.A.M.*, 8, pp. 16, 223; 10, p. 296; 25, p. 185] in symptoms, and 'false melanosis', usually attributed to abnormal temperature conditions, in etiology. Small, scarcely perceptible, light chestnut-coloured spots appear mostly on the lower leaf surface, but later on both, and gradually enlarge until they are 0·5 to 1 cm. in diameter. Sometimes they become confluent and cover an extensive area of the blade. With age they become reddish to dark brown. No causal organism appeared to be associated with the condition, which is provisionally correlated with abnormal transpiration [cf. ibid., 8, p. 224].

Weintraub (M.), Gilpatrick (J. D.), & Willison (R. S.). **The effect of certain water-soluble compounds on virus infection.**—*Phytopathology*, 42, 8, pp. 417–419, 1952.

A quick and economical method of testing the efficiency of certain water-soluble chemical compounds as virus inhibitors involves the inoculation of detached half leaves, the treated half being floated on the test compound and the control half on water [cf. above, p. 345]. Of 54 compounds assayed by this technique at the Dominion Laboratory of Plant Pathology, St. Catharines, Ontario, three were selected for their capacity to reduce significantly the numbers of lesions formed on *Nicotiana glutinosa* by tobacco mosaic virus [loc. cit.]. They were zinc chloride, zinc sulphate [cf. *R.A.M.*, 27, p. 532], both of which caused nearly 100 per cent. reduction in the lesion counts, and vitamin B_1, the last-named, however, being inconsistent in its effects. Zinc chloride was also effective in tests against carnation mosaic virus in *Dianthus barbatus*.

Bawden (F. C.) & Freeman (G. C.). **The nature and behaviour of inhibitors of plant viruses produced by Trichothecium roseum Link.**—*J. gen. Microbiol.*, 7, 1–2, pp. 154–168, 1952.

The results of co-operative experiments at Rothamsted Experimental Station, Harpenden, Herts., and Imperial Chemical Industries Ltd., Nobel Division Research Department, Stevenston, Ayrshire, were generally similar to those of Gupta and Price [*R.A.M.*, 31, p. 369] carried out simultaneously, viz., that the extent to which plant virus infection is inhibited [cf. ibid., 32, p. 60] by the two inhibitory substances produced by *Trichothecium roseum* depends on the host species and not on the identity of the virus. Trichothecin acted like ribonuclease in being relatively more effective with beans (*Phaseolus vulgaris*) than with *Nicotiana glutinosa*, whereas the polysaccharide and two derivatives of trichothecin, trichothecolone and acetyltrichothecolone, affected *N. glutinosa* more than beans. When sprayed on to the leaves one day after inoculation trichothecin inhibited infection by tobacco mosaic, tobacco necrosis, and tomato bushy stunt viruses but was ineffective when applied two days before. The reverse was true of the polysaccharide. It is suggested that the inhibitors alter the metabolism of the leaf cells temporarily so that introduced virus particles cannot multiply and are inactivated.

Weber (F.) & Kenda (Griseldis). **Die Viruskörper von Opuntia subulata.** [The virus bodies of *Opuntia subulata*.]—*Protoplasma*, 41, 4, pp. 378–380, 6 figs., 1952.

Further studies at the Institute of Plant Physiology, University of Graz, Austria, on the 'protein spindles' in virus-diseased leaves of *Opuntia subulata* [*R.A.M.*, 32, p. 301] revealed structural peculiarities, particularly conspicuous being the 'zebra' pattern formed by bundles of doubly refractive protein crystals alternating with zones of isotropic 'intermediate substance' (*Ber. dtsch. bot. Ges.*, 3, 1885; *Bot. Zbl.*, 31, 1887).

Pushkarnath. **Solanum jasminoides virus.**—*Curr. Sci.*, 21, 9, p. 249, 1952.

A new virus isolated from *Solanum jasminoides* at the Central Potato Research Institute, Patna, India, resembles potato virus Y [*R.A.M.*, 28, p. 115] in many respects, but is not transmitted by sap inoculation or grafting to *S. nodiflorum* or potato (varieties Craigs Defiance, Arran Victory, and Majestic). Chilli and *D*[*atura*] *tatula* are immune. On *S. jasminoides* it produces a fleeting type of mottle, while on White Burley tobacco, *S. nigrum*, *Hyoscyamus niger*, *Nicotiana glutinosa*, *Petunia*, and tomato, to which it can be transmitted by sap inoculation, a variety of symptoms develop. Only mottling symptoms appear on the last three. A complete collapse of the leaves, due to extensive phloem necrosis in the collar region, occurs on tobacco four to five days after inoculation, followed two days later by veinclearing and subsequent necrotic speckling and veinbanding. On *S. nigrum* veinclearing appears seven to ten days after inoculation and is followed by severe veinbanding. The corolla may change from rotate to stellate with long linear petals and the anthers are reduced to a vestige of brownish tissue at the tip of the filament. The lower leaves of *H. niger* collapse and the fleeting type of veinclearing appears.

The dilution end point of the virus varies from 1:1,900 to 1:2,000; it retains its infectivity for 24 to 48 hours at room temperature (23° to 27° C.); one hour's exposure to 50 per cent. alcohol completely inactivates the virus; and the thermal inactivation point is 60°.

In cross immunity tests virus Y was often found to give protection against the *S. jasminoides* virus, which is believed to have been introduced originally with the plant from South America. All local plants are infected.

Service and regulatory announcements. List of intercepted plant pests, 1949.—*S.R.A., B.E.P.Q., U.S. Dep. Agric.*, 77 pp., 1951.

Included in this list, compiled by W. H. Wheeler, Judith Hunt, and P. X. Peltier, of diseases intercepted on plant material entering United States territory from 1st July, 1948 to 30th June, 1949 [cf. *R.A.M.*, 29, p. 603] are citrus canker (*Xanthomonas citri*) [ibid., 30, p. 263; 31, pp. 183, 551], 11 interceptions on fruits from China, nine from India, and four from Japan; *Elsinoe australis* [ibid., 31, p. 182], taken 47 times on citrus fruits from South America; cancrosis B [a bacterial disease: ibid., 27, p. 352] six times on lemon from Argentina; *Phoma* [*Guignardia*] *citricarpa* [C.M.I. map No. 53] on citrus from Australia, China, Formosa, Japan, and South Africa; *Alternaria gypsophilae* on *Gypsophila paniculata* [*R.A.M.*, 28, p. 160] from Brazil; *E. phaseoli* on Lima beans (*Phaseolus lunatus*) from Puerto Rico and Cuba [C.M.I. map No. 194]; *E. piri* on apple [*R.A.M.*, 11, p. 723; 25, p. 563] from Poland; *Phyllosticta saccardoi* on rhododendron [ibid., 25, p. 395] from England; *Coleosporium senecionis* [ibid., 17, p. 281; 23, p. 156] on two seedling importations of Scots pine (*Pinus sylvestris*) and one of Swiss mountain pine from Denmark, which were intended for reforestation work in the United States where this rust is believed to be still unestablished; *Neovossia indica*, found twice on wheat from India [C.M.I. map No. 173]; *Curvularia lunata* [*R.A.M.*, 26, p. 406] on chilli pepper (*Capsicum frutescens*) from Cuba and on onion from Mexico and Sweden; *Gymnosporangium haraeanum* on *Juniperus* sp. from Japan [ibid., 20, p. 477]; and *X. hyacinthi* in hyacinth bulbs from the Netherlands [ibid., 30, p. 506]. A number of the pathogens were intercepted on plant material arriving by air.

Arrêté du 30 septembre 1952 relatif à l'importation de plants de Cacaoyers, de Cacao en cabosse ou en fèves et brisures de fèves (non torréfié), coques, pelures, pousses et pellicules de Cacao. [Order of 30th September, 1952, relating to the importation of Cacao slips, pods, beans, and ground (unroasted) beans, husks, shells, shoots, and pellicles.]—*Agron. trop.*, 7, 6, p. 659, 1952.

The importation of specified parts of cacao plants into Guadeloupe, [French] Guiana, and Martinique from any other country is permitted only on presentation of an official phytopathological inspection certificate issued by the country of origin guaranteeing that they are obtained only from registered crops free from infection by witches' broom (*Marasmius perniciosus*) [*R.A.M.*, 29, p. 14; C.M.I. map No. 37] in an area from which virus diseases have never been reported.

Arrêté du 30 septembre 1952, relatif à l'importation de plants de Caféier, cerises de Café, fraîches ou sèches, graines en parches et grains de Café décortiqués, frais ou secs et non grillés. [Order of 30th September, 1952, relating to the importation of Coffee slips, fresh or dried Coffee berries, and fresh or dried, unroasted Coffee parchment beans and dehusked seeds.]—*Agron. trop.*, 7, 6, p. 659, 1952.

The importation into Guadeloupe, [French] Guiana, and Martinique of specified parts of coffee plants from any country is permissible only on presentation of an official phytopathological inspection certificate issued by the country of origin declaring that they are produced only from certified crops free from rust (*Hemileia vastatrix*) [*R.A.M.*, 19, p. 688; C.M.I. map No. 5].

Dyer (R. A.). **Botany and plant pathology.**—*Fmg in S. Afr.*, 27, 321, pp. 601–603, 1952.

In this section of the Annual Report of the Department of Agriculture, South Africa, for the year ended 31st August, 1952 [cf. *R.A.M.*, 31, p. 536], it is stated that the injection of a spore suspension with a syringe is a more reliable method for testing inbred maize lines for resistance to the stalk rot organism (*Fusarium*

moniliforme [*Gibberella fujikuroi*] var. *subglutinans*) [loc. cit.] than the toothpick method. Soils in the Kroonstad area are heavily infested by the fungus. Seed of two varietal crosses with improved resistance to streak [maize streak virus] and high inherent yielding capacity will be released to farmers for further trial. *Sphacelotheca reiliana* was particularly severe on inbred lines in the Transvaal.

Citrus in South Africa appears to be affected by a virus complex [cf. ibid., 30, p. 268], the nature of which is being investigated. Sweet orange, self-rooted or on rough lemon, tolerates the complex as a whole but grapefruit, even on rough lemon or sweet orange stocks, Eureka lemon, and some varieties of tangerine, particularly Natal tight-skin naartje, show a strong tendency to decline. The possibility of growing some forms of citrus as seedlings is being investigated. The fruit of vigorous Eureka lemon trees appears to be more resistant to black spot (*Phoma* [*Guignardia*] *citricarpa*) [see below, p. 373] than that from badly declined trees although there is no evidence that viruses affect this association. Proper selection of budwood may reduce black spot infection in this variety.

Hortus 5, which is becoming one of the most important tomato varieties for winter production in the Lowveld, is losing its resistance to *Fusarium* wilt [*F. bulbigenum* var. *lycopersici*: ibid., 28, p. 364], as is the 1950 Durbot stock [ibid., 29, p. 181], but Durbot selection No. 18 is still highly resistant. Tomato blight (*Phytophthora infestans*) was again prevalent and caused considerable damage over a wide area from the Northern Transvaal to the Eastern Cape Province. Immunity from bacterial wilt [*Pseudomonas solanacearum*: ibid., 28, p. 186] is conferred on tomato plants grafted to *Solanum torvum* stocks.

The development of avocado trunk rot (*Phytophthora cinnamomi*) is arrested by injection with 0·15 per cent. methylene blue.

R. I. Nel, dealing with the fruit industry in the winter-rainfall area (pp. 630–635), states that in a saturated atmosphere at 25° C. distinct symptoms of vine bacterial blight (*Erwinia vitivora*) [ibid., 31, p. 473] become apparent in the laboratory within 48 hours. By using radio-active inoculum it was established that the bacteria can infect the vine through the undamaged leaf epidermis and can reach the internodes of a shoot within 48 hours of inoculation of the leaf tips. The great majority of commercial varieties being tested at Constantia are susceptible to the disease. A bacterium similar to *Pseudomonas* [*syringae* f. sp.] *prunicola* [ibid., 30, p. 14] was isolated from apricot trees affected by gummosis canker. Spraying with Bordeaux mixture reduced the leaf spot phase of the disease.

Deighton (F. C.). **Plant pathology section.**—*Rep. Dep. Agric. S. Leone, 1950*, pp. 20–21, 1952. [Received April, 1953.]

In this report [cf. *R.A.M.*, 31, p. 476] it is stated that as a result of the introduction of citrus scab (*Elsinoe fawcetti*) [ibid., 19, p. 692] into nurseries and plots at New Njala between 1940 and 1942 with budwood from diseased trees from Old Njala, it is no longer possible to control the disease by eradication of scabby trees throughout Sierra Leone. Agricultural stations, however, may still be kept free from the disease. At New Njala, where the disease has persisted since 1942, many of the sour orange seedlings were attacked in 1950. Destruction of these seedlings and defoliation and pruning back to short stubs of all budded plants proved beneficial and resulted in a temporary eradication of the disease [ibid., 32, p. 184].

A survey of groundnut leaf spot diseases (*Cercospora arachidicola* and *C. personata*) [ibid., 32, p. 90 and 7, p. 305, respectively] indicates that the former is more widespread, while the latter, though relatively rare, is common at Njala. Maize rust (*Puccinia polysora*) [ibid., 32, p. 309], though common in most parts of the country, was less severe than in 1949, this being probably due to the light rainfall in May and the unusually dry weather of late July and August, normally the wettest period of the year.

New records include *Cercospora mangiferae* on mango [ibid., 27, p. 158] and *Uromyces gladioli* on wild *Gladiolus klattianus*.

Notes on current investigations, July to September, 1952.—*Malay. agric. J.*, 35, 4, pp. 218–227, 1952.

In this report [cf. *R.A.M.*, 32, p. 118] it is stated that a *Gloeosporium* sp. was isolated from cacao [ibid., 15, p. 560; 31, p. 9] trees on an estate in Trengganu attacked by an unknown type of stem canker. The fungus probably enters through insect wounds on the stem. Other cacao diseases include a stem disease and a pod rot, each associated with a *Nectria* [ibid., 32, p. 303], the former causing the bark to turn dark purple with a firm, brown rot spreading upwards through the wood. A *Fusarium* stage usually preceded the *Nectria* fructifications in both cases. Red root disease (*Ganoderma pseudoferreum*) [ibid., 31, p. 9] is troublesome and was recently observed on a young planting in Selangor.

In studies on diseases of Manila hemp [*Musa textilis*] stem rot (*Marasmius stenophyllus*) [ibid., 18, p. 505] was found to be best controlled by the destruction of the affected stems, which may serve as important sources of infection. Slight attacks of *Helminthosporium torulosum* [ibid., 14, p. 312], not previously recorded in Malaya, were reported from the Federal Experiment Station, Kuala Lumpur. Tea blister blight (*Exobasidium vexans*) [ibid., 32, p. 119] was at a very low level at Cameron Highlands and pruning experiments have shown that under the conditions at the Agricultural Station, Tanah Rata, spraying of tea during plucking does not result in yield increases.

At Kuala Lumpur French beans [*Phaseolus vulgaris*] were attacked by bacterial wilt (*Xanthomonas* [*Pseudomonas*] *solanacearum*) [ibid., 19, p. 123; 20, p. 9] and *Corticium solani* [ibid., 31, p. 416], which was also observed on soy-beans [ibid., 31, p. 19] and *Centrosema plumierii* [ibid., 15, p. 578].

Annual Report of the Department of Agriculture, Dominica, 1949.—33 pp., [? 1952].

In this report [cf. *R.A.M.*, 29, p. 351] it is stated that further evidence appears to confirm the view that the reduced incidence of vanilla root rot (*Fusarium batatatis* var. *vanillae*) [ibid., 27, p. 464] in Dominica may be correlated with reduction of excessive cropping. Banana Sigatoka disease (*Cercospora musae*) [*Mycosphaerella musicola*] was not severe, but it will be necessary to take active steps to control the disease by spraying with Bordeaux mixture [ibid., 30, p. 525]; the Banana Association is to be responsible for the campaign, the cost of which will be defrayed by a levy of ½ cent per lb. on all bananas exported. Tomato wilt disease [? bacterial wilt due, possibly, to *Corynebacterium michiganense*: see Report for 1945, p. 6] caused serious losses in the American varieties Ponderosa and Marglobe, but the Canary Island varieties Lima, Pelota, and Surpressa showed marked resistance; the disease is locally a serious limiting factor to tomato growing.

Science for the farmer.—*Rep. Pa agric. Exp. Sta., 1950–51* (*Bull.* 553), 68 pp., 25 figs., 1952.

Among the items of phytopathological interest in this report [cf. *R.A.M.*, 32, p. 68] is an account of the air-blast sprayer [ibid., 31, p. 67] used for the control of apple scab [*Venturia inaequalis*: ibid., 32, p. 26], 4 gals. spray per tree at three times the usual low concentration being needed. Sulphur-ferbam at this rate, however, did not give quite such good control as when used in dilute form; organic mercury gave fair to good control. In work on cherry virus diseases in 245 Montmorency sour cherry trees by F. H. Lewis and J. S. Boyle since 1945, it was found that cherry yellows virus [ibid., 32, p. 135] spread only slowly until the trees became infected by necrotic ring spot [ibid., 32, p. 68]. Since 1945 over 90 per cent. of the

trees have contracted infection by one or both viruses. Shock symptoms were delayed and appeared in over 40 per cent. of the trees in one year. In 1950 ring spot reduced yields by 43 per cent. though the yields of trees which showed shock symptoms in 1950 and recurrent ring spot the next year were reduced by only 9 per cent. in 1951. Virus-free Montmorency cherry budwood is reported to be now available from the Fruit Research Laboratory, Arendtsville.

Potato varieties previously considered to be resistant to potato blight (*Phytophthora infestans*) [ibid., 32, p. 206] were shown to be susceptible to race D [loc. cit.] and they are being treated (including Kennebec and Essex) as susceptible because race D is now prevalent.

In further trials with various tobacco lines developed by E. O. Schneider and W. S. Beach at the Research Laboratory, Lancaster, in 1951, 90 per cent. of the 60 resistant lines proved highly resistant to wildfire [*Pseudomonas tabacum*: ibid., 32, p. 68] in the seed bed, the remainder being less than 10 per cent. susceptible, while 98 per cent. of the 31 lines combining resistance to wildfire and [tobacco] mosaic [virus: loc. cit.] were resistant to the former and 4 lines completely resistant to the latter, and only eight lines were more than 22 per cent. susceptible to mosaic. The majority of the resistant lines outyielded and outburned Swarr-Hibshman [loc. cit.], but the mosaic-resistant ones were inferior to it in leaf shape and cured leaf. In seed-bed spray trials for the control of tobacco blue mould [*Peronospora tabacina*: ibid., 32, p. 153] orthocide 406 gave none, fermate good, and dithane excellent control in two separate localities where the same spray schedule was used.

W. S. Beach reports that tomato early blight (*Alternaria solani*) [ibid., 31, p. 520] was best controlled by dithane D-14 spray, ziram (three applications) followed by two or more applications of tribasic copper sulphate, and the corresponding dust treatment, the increases in yield being 5·2, 4·2, and 2·4 tons per acre, respectively.

Patel (M. K.), Kulkarni (Y. S.), & Dhande (G. W.). **Some new bacterial diseases of plants.**—*Curr. Sci.*, 21, 12, pp. 345–346, 1952.

Descriptions are given of three new bacterial diseases in India [cf. *R.A.M.*, 32, p. 238], including *Xanthomonas melhusi* n.sp. on teak at Ambernath, Bombay State, in October, 1950, and *X. erythrinae* n.sp. on *Erythrina indica* at Patna, Bihar, in November, 1951. The former causes angular, water-soaked, translucent leaf spots, 0·5 to 1 mm., that turn brown to deep brown when dry and are raised on the upper surface; several coalesce into large lesions. *X. erythrinae* produces on the leaves numerous, water-soaked specks, which later become brown and surrounded by a halo; they measure 0·5 to 1 mm. and are raised in the centre on the under surface and flat on the upper surface. Veins are infected and occasionally raised on the upper surface, infection on the whole being more at the leaf edge. In severe cases the leaflets become chlorotic. The rods of *X. melhusi* measure 2·1 by 1·08 μ and those of *X. erythrinae* 1·6 by 1·1 μ. The optimum growth temperature for both is 28° C. and the thermal death point 51°.

Patel (M. K.), Wankar (B. N.), & Kulkarni (Y. S.). **Bacterial leaf-spot of Amaranthus viridis L.**—*Curr. Sci.*, 21, 12, pp. 346–347, 1952.

The authors propose *Xanthomonas amaranthicola* n. sp. as the name for the bacterium responsible for leaf spot of *Amaranthus viridis*, which was prevalent at Poona, India, in February, 1952. The organism is briefly described.

Dickson (J. G.), Grimm (G. R.), & Hooker (A. L.). **Stem rust control with fungicides.**—Abs. in *Phytopathology*, 42, 9, p. 465, 1952.

Certain naphthoquinones and phenols [*R.A.M.*, 32, p. 27] have exerted a fungicidal action at low concentrations on cereal stem rust (*Puccinia graminis*) [at the

Wisconsin Agricultural Experiment Station]. On wheat, for instance, uredospore germination was inhibited at 2 p.p.m., while spraying before inoculation, using the compounds at low dosages with a spreader and stabilizer, resulted in 90 to 100 per cent. control in several instances. On the other hand, similar treatments with the phenols two days after seedling inoculation in the greenhouse at 20° C. failed to reduce the number of uredosori, while the naphthoquinones were only slightly effective. Ethyl alcohol solutions of phygon with a stabilizer are apparently the most economical of the naphthoquinones at present available.

Wu (C. S.) & Ausemus (E. R.). **Inheritance of leaf rust reaction and other characters in a spring Wheat cross.**—*Agron. J.*, 45, 2, pp. 43–48, 1953.

At the University of Minnesota, Lee, a selection of Hope × Timstein wheat resistant in the mature-plant stage to a collection of races of brown rust (*Puccinia rubigo-vera tritici*) [*P. triticina*: *R.A.M.*, 32, p. 244 and next abstract] and in the seedling stage to 22 individual races, was crossed with the susceptible Mida. Field observations indicated that the adult resistance of Lee was differentiated from the susceptibility of Mida by two pairs of independently inherited genes, the effect of which was additive, with an apparent partial dominance of susceptibility. Some plants and lines that were highly susceptible to *P. graminis* occurred among hybrid progenies of the brown rust resistant parents. The segregations obtained in the F_2 and F_3 are explained by postulating duplicate, independently inherited dominant factors for resistance, one from each parent.

Greenhouse studies on the seedlings of F_4 progenies of 90 F_3 lines selected at random showed that the resistance of Lee to race 126 of *P. triticina* was controlled by a single recessive factor and to race 5 by a single dominant one, both linked with a recombination percentage of $21 \pm 2{\cdot}7$. Both the parents were highly resistant to race 9, and segregation for moderate resistance is explicable on the basis of duplicate factors. The Lee factors for seedling resistance to races 9, 5, and 126, whether dominant or recessive, besides one of the two factors for field resistance, all appeared to be associated in inheritance.

Heyne (E. G.) & Livers (R. W.). **Monosomic analysis of leaf rust reaction, awnedness, winter injury and seed color in Pawnee Wheat.**—*Agron. J.*, 45, 2, pp. 54–58, 2 figs., 1953.

At the Kansas Agricultural Experiment Station genetic and correlated cytological studies were made on monosomic plants of the F_1 and F_2 generations of crosses between 16 monosomic types of Chinese spring and Pawnee winter wheat in respect of reaction to race 9 of leaf rust (*Puccinia triticina*) [see preceding abstract] and other characters. Pawnee was found to carry one major factor for resistance to race 9 located on chromosome X, which probably interacts with a factor from Chinese to produce a bifactorial segregation in the seedling stage. The remaining factor or factors involved were not assigned to any of the other 15 chromosomes investigated.

Shurovenkov (B. G.) & Volkov (S. T.). Электротермическая установка для обеззараживания семян зерновых культур от пыльной головни. [An electrothermic apparatus for disinfecting cereal seed against loose smut.]—Докл. Акад. сельскохоз. Наук. Ленина [*Rep. Lenin Acad. agric. Sci.* = *Proc. Lenin Acad. agric. Sci.*], 17, 10, pp. 17–21, 1 diag., 1952. [Received April, 1953.]

A description is given of an electrothermic apparatus for disinfecting wheat seed against loose smut [*Ustilago tritici*: *R.A.M.*, 30, p. 517]. The grain, contained in wire baskets, is immersed in a water bath heated by electrical elements. The

advantages of this apparatus are that seeds can be treated in their storage places at any time of the year, hydro-electric power can be used, the heating elements, owing to their simple structure, can be made in farm workshops, and water temperature is easily controllable.

Blair (I. D.). **Parasitism and saprophytism among soil pathogens.**—*Rep. Sci. Congr. roy. Soc. N.Z., 1951*, pp. 45–46, 1952.

In studies at Canterbury Agricultural College, New Zealand, attempts were made to isolate *Cercosporella herpotrichoides* [*R.A.M.*, 31, p. 319] from potted soil in which wheat plants inoculated with the fungus had been grown. In no instance was the fungus isolated independently of pieces of infected straw. It was also ascertained that *C. herpotrichoides* was unable to develop independently in natural (non-sterilized) soil, the saprophytic phase being confined, apparently, to plant tissue. In another experiment green wheat stems were disinfected with propylene oxide vapour and while held in stoppered tubes were inoculated with *C. herpotrichoides*. After the fungus had become established small pieces were buried in soil, and at different intervals macerated pieces were seeded over the surface of Warcup's soil medium [ibid., 29, p. 530]. A low proportion of *C. herpotrichoides* was detected on straws lifted after two weeks, but none at all after four weeks' burial. Sporing was induced by keeping agar or tissue cultures moist and covered at room temperature (fluctuating day and night winter temperature). The fungus sporulated abundantly on straws lifted after seven months' burial and submitted to these conditions. Under field conditions straws on the [soil] surface two years after a diseased crop had been harvested were still able to produce spores.

Thus, the organism is able to persist while the straw remains undecomposed, and when so established appears to be less susceptible to limiting competition than when free in the soil dissociated from plant tissue. Experimental evidence demonstrated the partiality of *C. herpotrichoides* cultures for organic forms of nitrogen, notably peptone. Chromatographic analyses of straw for amino acids demonstrated that aspartic acid, glutamic acid, and tyrosine were especially dominant in wheat straw, and the suggestion is made that the persistence of the fungus in straw residues is contingent upon the availability of such nutrient complexes.

Hirai (T.), Goto (H.), Kato (H.), & Yasumi (T.). **Studies on the snow-blight diseases of winter cereals. III. Seasonal changes and varietal difference in content of sugars and nitrogen compounds in Wheat plants under snow cover.** —*Ann. phytopath. Soc. Japan*, 16, 1, pp. 1–5, 5 graphs, 1952. [Japanese, with English summary. Received March, 1953.]

Changes in the sugar and nitrogen concentrations in wheat plants under snow cover in Japan were studied from 1947 to 1950. Snow-resistant varieties contained more sugar and had a higher ratio of protein and non-protein nitrogen compounds to the green weight than non-resistant varieties during every stage before and after snow cover. Sugar decrease followed by protein decrease takes place during the first two months under snow. At the final stage of snow cover the amount of ammonium nitrogen compounds tended to increase in the less resistant varieties while the amide nitrogen compounds tended to increase in the resistant varieties.

Insects the cause of Wheat mosaic.—*Seed World*, 72, 4, p. 47, 1953.

Studies on the transmission of wheat mosaic virus and western wheat mosaic virus [? a strain of wheat mosaic virus: *R.A.M.*, 32, p. 239] have been carried out since 1949 by Kansas State and the United States Department of Agriculture. Some 42 different species of insects have been tested and some are responsible for the spread of the virus. No seed transmission was secured. Of the numerous wheat varieties tested only a few moderately resistant ones show any promise.

Popp (W.) & Cherewick (W. J.). **An improved method of smut inoculation.**—Abs. in *Phytopathology*, 42, 9, p. 472, 1952.

A practical and effective method for the inoculation of barley with *Ustilago hordei* and *U. nigra* and of oats with *U. kolleri* and *U. avenae* has been developed [at the Dominion Laboratory of Plant Pathology, Winnipeg, Canada: cf. *R.A.M.*, 31, pp. 427, 600]. The violent agitation of the grain in an aqueous spore suspension (2 gm. per l.) in a Waring Blendor with blunt blades for about 25 seconds is followed by slow drying in seed envelopes at room temperature, the former process loosening and cracking the hulls and the latter permitting spore germination and mycelial development beneath them. The suspension is maintained at a constant level in the Blendor by replenishment after each treatment. Two persons can inoculate and package as many as 120 seed lots per hour.

Hingorani (M. K.). **Morphological and pathological studies of races 2, 7, and 8 of Oat stem rust.**—*Phytopathology*, 42, 9, pp. 486–488, 1952.

At University Farm, St. Paul, Minnesota, statistically significant differences in uredospore size were observed between physiologic races 2 and 7 and 8 and 7 of stem rust of oats (*Puccinia graminis avenae*) [*R.A.M.*, 32, p. 247 and next abstract] grown under identical conditions, but no appreciable dissimilarity between 2 and 8. The uredospores of 7 were rather less uniform than those of 2 and 8, but the three races fell within the range of variation expected for *P. g. avenae* (19·2 to 37·1 by 13·7 to 25·6 μ). Significant fluctuations were induced in the uredospore size of each race by varying environmental conditions (reduced temperature and light intensity), a resistant host also tending to decrease spore size and increase variability.

Race 8 caused slight infection of some wheat, barley, and rye varieties, but otherwise none of the races produced any visible effect on cereals apart from oats, all varieties of which were susceptible. Of 49 species of grasses inoculated with the three races, 38 were entirely immune, the most susceptible of the remainder being *Dactylis glomerata*, *Festuca rubra*, and *Koeleria cristata* [*K. gracilis*].

Osler (R. D.) & Hayes (H. K.). **Inheritance studies in Oats with particular reference to the Santa Fe type of crown rust resistance.**—*Agron J.*, 45, 2, pp. 49–53, 1953.

Studies on the reaction to 14 races of oat crown rust (*Puccinia coronata*) in crosses between Santa Fe and two selections from Bonda × Hajira-Joanette and Hajira-Joanette × Bond-Rainbow are fully reported from the University of Minnesota [*R.A.M.*, 32, p. 75]. Other subjects investigated were the inheritance of resistance to a mixture of *P. graminis* races 7 and 8 [see preceding abstract] and the association between resistance to the two rusts and other characters. Resistance to all 14 races of *P. coronata* appeared to be conditioned by three factors, designated C, D, and S. C and D were complementary, independently inherited, dominant factors, while S was a different dominant factor inherited independently of the other two. Resistance was controlled either by C and D together, S alone, or a combination of all three. The Santa Fe progenitor was apparently SS. Studies on the F_4 seedling reaction yielded evidence that the Santa Fe type of resistance to race 45 governed resistance to all the other races used in the tests, and that the Santa Fe factors were not allelic to either of the complementary factors for resistance carried by Bond.

The behaviour of the F_3 progenies of both crosses suggested that the Hajira-Joanette type of resistance to a mixture of stem rust races 7 and 8 was regulated by a single-factor pair.

No association was observed between rust reactions and date of heading, number and length of basal hairs, percentage of lower florets awned, strength of awns, or plumpness of seed. Thus, it should be relatively easy to combine in a single variety (1) the Hajira-Joanette type of resistance to many, or possibly all, of the known races of *P. graminis*, (2) the Santa Fe type of crown rust resistance to the 14 races studied, and (3) precocity, desirable awn development, and plumpness of seed.

Research work and workers.—*Seed World*, 72, 4, pp. 38–39, 1953.

A new oat variety, Clintafe, resistant to crown rust [*Puccinia coronata*: see preceding abstract] and *Helminthosporium* blight [*Pyrenophora avenae*: *R.A.M.*, 29, p. 353; 32, p. 309] and tolerant of *Septoria* black stem [*Leptosphaeria avenaria*: ibid., 32, p. 248], has been released by Iowa State College.

Johnson (J. R.). **The effects of a series of seed protectants on repression of fungi in and on Corn seed.**—Abs. in *Phytopathology*, 42, 5, p. 284, 1952.

In greenhouse experiments in 1951, 1 per cent. semesan jr. was the most effective of the seed protectants tested on Golden Cross Bantam, Hastings Prolific, Dixie 18, and N.C. 27 maize. It was closely followed by 6·7 per cent. agrox and 3·25 per cent. mergamma. Arasan at 1 per cent. and M.E.M.A. [*R.A.M.*, 32, p. 307] at 4 were significantly less efficacious than the foregoing, but all the treated lots were superior to the controls in respect of growth, colour, and emergence.

Johnson (L. F.). **Control of root rot of Corn under greenhouse conditions by microorganisms antagonistic to Pythium arrhenomanes.**—Abs. in *Phytopathology*, 42, 9, p. 468, 1952.

In further tests of the antagonism of fungi and actinomycetes isolated from soils [at the Louisiana Agricultural Experiment Station] to *Pythium arrhenomanes* on maize seedlings [*R.A.M.*, 32, p. 213 and cf. below, p. 400], seven actinomycetes and five isolates of *Spicaria*, *Penicillium*, and *Aspergillus* significantly reduced the severity of root rot, and most of them were also highly antagonistic to the pathogen in agar cultures, producing a zone of inhibition of or exceeding 10 mm. Many highly antagonistic isolates, however, did not effect a reduction in root rot.

Dillon Weston (W. A. R.) & Schofield (Elizabeth R.). **Control of Millet smut by seed disinfection.**—*Plant Path.*, 1, 1, pp. 29–30, 1 pl., 1952.

A head of millet (*Panicum miliaceum*) infected by smut (*Sphacelotheca destruens*) [*R.A.M.*, 27, p. 462] from a crop at Walton-on-the-Naze, Essex, was used as a source of inoculum in seed treatment trials at Cambridge in 1950. Clean millet seed was kept in a saturated atmosphere at 28° C. for 5½ hours and then shaken with the inoculum in a closed glass jar. Portions of the contaminated seed were shaken (dry) with organo-mercury seed dressings A, B, and C, all at 3 oz. per bush., copper carbonate (2 oz.), and a preparation containing 50 per cent. thiram at 6 oz. per bush. Wet treatments were copper sulphate (five minutes' steep in 2½ per cent. solution) and formaldehyde (sprinkle, 1 part of 40 per cent. formaldehyde in 320 parts of water).

Apart from a single smutted head in one plot, all the organo-mercury treatments and copper carbonate gave complete control. Copper sulphate gave only 2 smutted heads in 1,763, but formaldehyde and thiram allowed about 1 and 0·5 per cent. infection, respectively, as against 25 per cent. for the untreated. The total number of heads was increased by treatment A and thiram.

In a further trial in 1951 untreated seed produced 73 per cent. smutted heads, formaldehyde 17·5 per cent., and treatments A and B no infection.

Wager (V. A.). **The black spot disease of Citrus in South Africa.**—*Sci. Bull. Dep. Agric. S. Afr.* 303, 52 pp., 11 pl., 1952–3.

A survey is presented of the current knowledge of citrus black spot (*Guignardia citricarpa*) in South Africa [*R.A.M.*, 27, p. 563; 30, p. 35, and above, p. 366], much of which has already been noticed in this *Review*.

The pycnidia are commonly 140 μ in diameter, the pycnidiospores 10 by 7 μ, asci 50 to 55 by 11 μ, and ascospores 14 by 7 μ. Ascospores developed in specially treated leaves [ibid., 29, p. 209] three weeks after they were picked. Pycnidiospores require water droplets for emergence and dispersal but the ascospores are ejected forcibly into the air and are dispersed by wind. Cultures from leaf or fruit spots grew more slowly than those from dead or treated green leaves. In all other respects isolates of the fungus were alike. Most cultures made maximum growth at 75° to 80° F. Pycnidiospores retained their germinative capacity up to five months. Typical leaf spots were produced by splashing either pycnidiospores or ascospores on to young lemon trees bearing a flush of growth. Spots were produced more readily on starved than on well-fertilized trees. Negligible damage results from fumigation with hydrogen cyanide after applications of Bordeaux (2–1–80) if it is done three or four months later and during a dry spell. The only other host plant found in South Africa so far is *Smilax kraussiana*.

Kovachich (W. G.). **Little leaf disease of the Oil Palm (Elaeis guineensis), in the Belgian Congo.**—*Trop. Agriculture, Trin.*, 29, 4–6, pp. 107–114, 3 pl., 1952.

Little leaf disease of the oil palm, a name proposed to include both bud rot [*R.A.M.*, 15, p. 147] and little leaf [ibid., 28, p. 272], which are considered as two stages of the same disease, probably of physiological or virus origin, is very widespread in the Belgian Congo, particularly in the south, where it causes 20 to 25 per cent. loss in young plants (seven to ten years after transplanting). The disease appears to be very similar to coco-nut bud rot (*Phytophthora* [*palmivora*: ibid., 29, p. 617]), but in inoculation experiments with fungi and bacteria commonly associated with little leaf and isolated from rotted tissues, also with little leaf tissue, the disease could not be reproduced nor was it cured by cutting out the rotted tissues.

The earliest sign of the disease is in the much shorter, more erect, slightly chlorotic leaves of the innermost whorl. Dark brown rotting and collapse of the central spear at a point within the central frond cylinder follow and are associated with a putrid smell. Later the putty-white rotted tissues turn orange, then brown, and become infested with insect larvae. The apical meristem may be destroyed and the palm killed, but the rot may be arrested by the formation of callus tissue in the leaf rachides before reaching the meristem. Growth may be resumed, two or more spears being produced, or suspended for several years with fruit branches sometimes continuing to develop. Internally, the bud leaves are compressed and abnormally white and there is abnormal tissue in the trunk below the apical meristem. Sometimes in the early stage of the disease buds appear healthy but the very young leaves of the central spear are distorted, with malformed pinnae and rachides and corrugated leaflets, or some of the pinnae are completely missing. These leaves, typical of the little leaf abnormality, are the first to open after growth is resumed. Subsequent leaves are progressively less affected and the palm is finally indistinguishable from a healthy one. Sometimes palms undergo a second or a third attack of the disease, which is usually more severe.

The trunks of the affected palms are apparently healthy though in severe cases of long standing a dull red colour (which persists even after the recovery of the tree) is observed in the ground tissue and sometimes in the vascular strands of the crown, and is more intense near the rot. Roots are mostly of the arrested type with the

tips covered by a hard exodermis. They may resume normal growth but only long after the opening of the little leaf type leaves.

The cells of the abnormal tissue of affected buds and leaves are much smaller, with abnormal, irregular, and smaller nuclei than those in the healthy tissue. A cambial layer separates the healthy from the abnormal tissue. Of seven young palms (five to six years old) tested for bud rot as a result of damaging the roots, four developed typical little leaf and bud rot symptoms. The susceptibility of oil palms is influenced by poor soil conditions, dry periods lasting two to two and a half months, and high fruit yields, and this suggests a physiological disorder. The spread of the disease, on the other hand, which occurs from an affected palm either to an adjacent one or the next, the presence of abnormal tissue in the meristematic regions of the bud, and the distortion and discoloration of the young leaves all point to a virus condition.

Progress Reports from Experiment Stations, season 1950–51.—159+vi pp., 10 graphs, London, Empire Cotton Growing Corporation, 1952. 3*s*.

In the report from the Cotton Research Station, Namulonge, Uganda [cf. *R.A.M.*, 31, p. 184], G. M. Wickens states (pp. 12–19) that three possible methods of obtaining uniform infestation of cotton seed by *Xanthomonas malvacearum* [see next abstract] were tried on a range of strains carrying various gene combinations for resistance. Inoculation with leaf debris suspension was completely ineffective. Coating the seed with bacterial slime caused greater pre-emergence mortality than soaking in a bacterial suspension but produced on an average less seedling disease. Suspension soaking would therefore appear to be the better method for general practice. BAR 7/8 (B_2 B_3) showed a high degree of escape from cotyledonary infection under both forms of treatment; Stoneville 20 [ibid., 31, p. 422; 32, p. 253] failed to show high resistance to cotyledonary infection, but remained relatively free from later secondary attack and damaging main stem lesions. For leaf infection foliage sprays with bacterial suspensions were invariably highly effective, and in these tests Stoneville 20 was consistently and markedly superior. Inoculations designed to give a direct measure of the resistance of stem tissues gave conspicuously good results. Bacteria from cultures were introduced into the stems with sewing-machine needles or by atomizing the suspension on to scratches. Alternatively, terminal buds were either brushed or forcefully sprayed with a strong water suspension of bacteria. The plants were later graded (0 to 3) for severity of main stem lesions. Stem wounding was greatly superior to bud brushing or spraying. With all methods Stoneville 20 was strikingly the least affected, while BAR 7/8 gave evidence of a useful measure of resistance. In the earlier experiment there was no evidence of B_2 conferring on stem tissues any appreciable resistance. The needle-prick method offers much promise as a means of determining inherent resistance to what is, perhaps, the most destructive phase of blackarm. Inoculations can be made rapidly, and grading is also rapid and simple. In a test of the susceptibility of the young bolls at about the time of flower drop all methods used induced considerable boll disease, chiefly at the base, where natural infections occur. The most successful method was atomization into the calyx cup, atomization into the bracts at flowering being next. Stoneville 20 and BP 52 were the least severely affected, and B 181 was the best of the remainder. There was no evidence that the B_2 or B_3 genes conferred any resistance to this form of attack. BP 52 (Modal Bulk stock) is notable for resistance to bacterial boll disease, being about equal to Stoneville 20 in this respect. It is apparent that resistance to one form of attack does not necessarily imply resistance to others, and at present no single criterion can be advocated, under Uganda conditions, as indicative of effective resistance to the disease.

In a subsidiary experiment a number of strains, mostly from other territories,

were tested by spraying with a suspension. Of particular interest was the group from Dr. R. L. Knight, carrying between them all the known resistance genes so far recognized as operative in the Sudan. BAR 4/18, UA 8–48 and BAR 17/1, BAR 4/16, BAR 14/21 and BAR 14/9 appeared resistant, in that order. There were no typical angular leaf spots on BAR 4/18, and on the other resistant strains the spots, though sometimes numerous, were very small and rapidly dried out. Later in the season BAR 4/18, UA 8–48, BAR 17/1, Rex 4710, and Rex 474 developed no main stem lesions. The virtual immunity of BAR 4/18 is particularly striking as *barbadense* types generally suffer much more than comparable Upland material. 'Albar' and the Nigerian strains also remained remarkably free from blackarm, though the latter had suffered from severe angular leaf spot. In view of the high resistance of 'Albar' (a single plant selection from ginnery seed of Nigerian Allen) an attempt was made to secure more variable material of high resistance by selection in a plot of Allen subjected to periodical artificial infection; after the final roguing 39 plants with little infection were left.

A number of strains were tested for resistance to *Verticillium* wilt (*V. dahliae*) by means of stem wound inoculation, and enough material has now been tested to show that reaction to artificial stem inoculation should indicate accurately the relative behaviour of strains under natural infection. Over 800 plants could be inoculated in one morning, with almost 100 per cent. success. V 135 showed very uniform and very high resistance, with not more than about two leaves on any plant at any time showing slight symptoms. B 181 and KP 28 and two Acala strains were predominantly resistant. BP 52/2 MB was very variable, giving promise of yielding by selection strains with good resistance. S 47 appeared appreciably more resistant than others, such as MU 8a and especially U 4/8161. The mode of inheritance of resistance in the B 181 family is complex. A study of the behaviour of wilt during a manurial trial (at Barberton, South Africa) [cf. ibid., 31, p. 184] showed that applications of compost resulted in good yields even when severe wilt developed but stimulated more wilt in the succeeding crop. Potassium gave good yields even when wilt was severe, and retarded wilt increase in the succeeding crop. Superphosphate gave yields well below those of the control and stimulated subsequent wilt increase. In a variety trial on heavily infested land (at Barberton) B 181 and KP 28 showed high and very high resistance, respectively.

In the report from the Serere Station, Uganda (pp. 27–44) [cf. ibid., 30, p. 157, and next abstract], J. D. Jameson and D. G. Thomas report on the first two seasons' work in a new investigation on the control of cotton blackarm carried out with the assistance of W. T. Cowan of Plant Protection, Ltd. (1949–50) and J. M. Pottie of Imperial Chemical Industries, Ltd. (1950–51). The manner of geographical distribution of infection across the north-eastern part of Uganda appears to indicate that seed infection is heaviest where time of planting and distribution of rainfall are such that green bolls are likely to become infected without aborting, but it does not follow that the areas where seed infection is heaviest are those where the disease does most damage. Experimental evidence showed that mechanical delinting and soaking the seed in water increase infection, while acid delinting and exposing the seed to sunlight reduce it. The effect of treatments, whether they increase or reduce infection, appears to be intensified by storage between treatment and planting. Preliminary tests indicated that trash collected after the 1948–9 season was still infective in November, 1949. In each season an extensive experiment was arranged on freshly opened land, half the plots being strewn with trash from the previous season's crop. This comparison was combined with five seed treatments. The percentages of population developing main stem infection in 1949–50 after no treatment, 6 per cent. *gamma* BHC, agrosan GN 5 (5 per cent. organo-mercury), BHC plus agrosan GN 5, and R 1489×32 (5 per cent. organo-mercury) were, respectively, 50·3, 37, 17·7, 12·7, and 10·3 in the plots without trash,

and 60, 38, 19·3, 22, and 16·7 in those with trash; the corresponding figures in 1950–1 were, 8·5, 3·2, 1·7, 0·7, and 0·5 and 9·5, 7·2, 2·5, 5, and 3·3. There is reason to suppose that a seed dressing gives protection to a certain distance round each germinating seedling and so reduces infection from trash. Other tests demonstrated that dry dressings and short wet treatments (2 per cent. v/w) had no phytotoxic effects, though some steeps had. In a preliminary field trial 0·3 per cent. of population developed main stem lesions after treatment with R 1038 × 27 (3·8 per cent. organo-mercury) as against 35·7 per cent. for the untreated. In preliminary and main field trials an insecticide (with and without mercury) was included as a seed dressing and in every instance gave partial but appreciable control. Checking insects, therefore, seems to be important. Evidence was also obtained that seed dressing gives a cleaner crop and cleaner seed at harvest; when this seed is sown, even without dressing, the yield response from the second crop is great.

As perenox had been found to be safe and effective in small trials at Serere, a bulk scale test was made in Teso district in 1950–1. S 47 had a lower germination than N 17 or BP 52, but within S 47 the dressed seed germinated better than the natural seed. Main stem infections were fewer in areas sown with dressed seed, this effect being clearly visible two months after the observations had been made. There was everywhere a suspicion that the closer populations were the more heavily infected and that blackarm was a sequel to good germination. In 14 district variety trials in 1949–50 S 47 averaged 15·6 per cent. blackarm and a total yield of 891 lb. seed cotton per acre; in 1950–1 the corresponding figures were 14·5 per cent. and 1,057 lb. S 47, released to the first Segregated Area in 1947, yields well over a wide range of places, seasons, and planting times. Susceptible to *Verticillium* wilt [cf. ibid., 26, p. 244; 27, p. 474], it is somewhat resistant to blackarm, though less so than B 181, KP 28, or S 4108, of which the first two are now retained only as donors of wilt and blackarm resistance. S 4108 [loc. cit.] is very resistant to blackarm; in the face of severe attack after a hailstorm at Bulopa in 1949–50 it produced a much bigger crop than any other variety, and the cotton was much cleaner. It has been used as donor parent in a transference to S 47.

J. E. Peat and J. M. Munro report from Lake Province, Tanganyika Territory (pp. 53–59), that in cotton breeding work none of the Ukiriguru material showed worth-while blackarm resistance [ibid., 30, p. 509], in spite of the fact that B_2B_2 can be obtained from most strains. The addition of blackarm resistance to the main Ukiriguru strains is now a major part of the breeding programme. The damage done by the disease has been appreciable and the general impression is that the loss incurred is greater under poor growing conditions; stand is reduced by killing just after the cotyledonary stage. On manured land the plants seem better able to grow away in part from the attack and crop reasonably well. Albar 49, grown for the first time at Ukiriguru, showed outstanding resistance.

M. S. Hastie (pp. 60–64) states that *X. malvacearum* is of paramount importance to the cotton crop in Nyanza Province, Kenya [C.M.I. map No. 57]. Severity is greatest at the higher altitudes where rainfall is heaviest.

In the Anglo-Egyptian Sudan (pp. 68–91) an experiment was carried out at the Gezira Station by R. R. Anson, M. F. Rose, and L. C. Hughes in which 12 strains of cotton, each a single row alternating with one of DS (control), were sown late to encourage leaf curl virus [*R.A.M.*, 32, p. 118]. All the resistant strains were significantly better than DS. In work at Shambat by R. L. Knight and J. Sadd on the production of Egyptian varieties resistant to blackarm and leaf curl [loc. cit.], seed from 13,739 healthy, ratooned BLR 14/16 plants (with B_2+leaf curl resistance) was sown on 9th November, 1950, and only two plants developed leaf curl, though the disease was general over the rest of the farm. Over one ton of seed from BLR 14/25 (B_2B_3+leaf curl resistance) was obtained for propagation; this 'wave' of BLR 14/25 will be almost immune from blackarm, but only

moderately resistant to leaf curl. Rigorous roguing and selection of BLR 14/25 plants yielded 1,095 natural and 472 self-bred plants free from leaf curl at the close of the season. The disease was severe on all susceptible types grown at Shambat. H. Douwes and R. L. Cuany state that a strain of Samaru 26C with grade '3–4' resistance to blackarm has been rendered homozygous for resistance and bulked under the number BAR 18/3. One plant of *Gossypium thurberi* was cut back and later developed intense leaf curl, this being the first record of a severe attack on this species. *G. somalense* was ascertained to be the most susceptible of the diploids, while *G. raimondii* can contract the disease.

K. C. Barlow reports from Kadugli Station, Anglo-Egyptian Sudan, that in a miscellaneous variety trial BAR 7/8 [see above, p. 374] was outstanding for resistance to blackarm. Heavy primary infection developed from commercial seed and, coupled with a very wet season, resulted in one of the worst outbreaks of blackarm experienced in the Nuba Mountains for many years. The gene B_2 failed to control the attack and a rapid multiplication of B_2B_3 stocks is clearly desirable. On plots sown late to encourage infection the marked resistance of BAR 7/8 was demonstrated.

According to H. C. Ducker (pp. 92–97) there was a heavy initial attack of blackarm in Nyasaland, with much primary infection on plants grown from 1949–50 Cotton Experiment Station seed. Karonga CLB, from seed obtained from a winter or rainless crop, showed no primary infection.

From the Cotton Research Station, Gatooma, Southern Rhodesia, A. H. McKinistry and R. W. James report (pp. 98–104) that blackarm is now the main limiting factor there in breeding strains with better quality lint derived from MU 8A×BP 52[2]. The Modal Bulks formed last season from the Barberton strains A 5851, A 616, etc., were so badly affected that it was impossible to obtain sufficient seed cotton from single plants for analysis.

It is reported from St. Vincent, West Indies, by H. A. Francis (pp. 147–149) that small patches of cotton affected by wilt (*Fusarium vasinfectum*) [cf. ibid., 32, p. 186] occurred at Camden Park Experiment Station and in other fields, mainly on coastal valley soils. Though the total amount of infection was small, the disease was fairly widely distributed.

Jameson (J. D.). **Report on blackarm disease of Cotton.**—*Rec. Dep. Agric. Uganda* 2 (*1949–50*), pp. 1–3, 1952.

In this brief report [cf. *R.A.M.*, 31, p. 173] on the history and control of cotton blackarm (*Xanthomonas malvacearum*) in Uganda [see preceding abstract], where it is the most important disease of the crop, it is stated that it causes heavy loss of yield almost every year. Experimental research on the disease has been in progress locally for 23 years, and during the period under review (1st April, 1949, to 31st March, 1950), an attempt was made to put all the accumulated results together in an intensified effort to devise a practical means of control.

Though useful results with seed disinfection were obtained early in the investigations it was considered that the active substances were dangerous to use in the primitive conditions then prevailing and breeding of resistant varieties was begun. The lesion count method of assessing the amount of infection originally adopted by Hansford [cf. ibid., 13, p. 289], unsatisfactory because it was dependent on plant size, was replaced in 1935 by recordings of infection on the main stem [cf. ibid., 16, p. 235], but this failed for a time as the records were made late in the season and secondary infection tended to level up the attack. In 1944 the investigators established a moderately good technique for estimating damage by taking the main-stem observation within two months from planting, using seed with comparable amounts of primary infection or with infection artificially standardized. Knight's work [ibid., 18, p. 796] and the technique of leaf spot grading in the

Sudan which worked well under certain conditions at Serere led to the breeding of the resistant variety S 47. The method was unsuccessful at Kawanda, however, and even at Serere its behaviour was much modified by heavy rainfall, and it is now generally agreed that the gene B_2 alone confers very limited resistance on cotton growing under rainfall. In 1949 work to discover an effective chemical seed dressing safe to use in a primitive community was begun in collaboration with Imperial Chemical Industries, Ltd.

Re-examination of rainfall records, suggested by Watts Padwick, revealed strong evidence that the early onset of rain in the close season is one critical factor determining the amount of blackarm in the subsequent crop, and the eventual yield of that crop [ibid., 32, p. 252].

Sundaram (N. V.). **New host for Xanthomonas malvacearum (Smith) Dowson.**—*Curr. Sci.*, 21, 11, p. 320, 1952.

In inoculation experiments on a number of local plants at the Division of Mycology, Department of Agriculture, Madras, *Xanthomonas malvacearum* [*R.A.M.*, 32, p. 252 and preceding abstracts] was successfully transmitted to and reisolated from *Jatropha curcas*.

Kamat (M. N.), Patel (M. K.), & Dhande (G. W.). **Occurrence of the green muscardine fungus on Pyrilla sp. in Bombay.**—*Curr. Sci.*, 21, 11, p. 317, 1952.

Metarrhizium anisopliae [*R.A.M.*, 11, p. 782; 25, p. 161] has been identified in studies at the Plant Pathological Laboratory, College of Agriculture, Poona, as the fungus naturally parasitizing leafhoppers (*Pyrilla* sp.) in large numbers in the sugar-cane fields on the Deccan Canals in Bombay State.

Cruickshank (I. A. M.). **Rust of Linseed and Linen Flax : life cycle and control.**—*N. Z. J. Agric.*, 85, 2, pp. 123–124, 3 figs., 1952.

In this survey of current knowledge of flax rust (*Melampsora lini*) [*R.A.M.*, 32, p. 79] from the Plant Diseases Division, Department of Scientific and Industrial Research, Auckland, New Zealand, the control methods summarized include the eradication of wild flax before it sets seed and of volunteer cultivated plants by autumn ploughing, heavy winter and spring grazing of pastures, early sowing according to locality and season but not later than the end of October, a three- or four-year crop rotation, and seed dusting with a fungicidal dressing.

Frederiksen (P. S.). **Undersøgelser over en række Spind- og Oliehørsorters modstandsdygtighed mod Hørrust (Melampsora lini (Pers.) Lév.).** [Studies on the capacity for resistance to Flax rust (*Melampsora lini* (Pers.) Lév.) of a number of fibre and linseed Flax varieties.]—*Tidsskr. Planteavl*, 56, 2, pp. 246–271, 1 graph, 1953. [English summary.]

A tabulated account is given of two series of inoculation experiments, the first in 1948–9 and the second in 1950–1 at the Danish Flax Research Institute, to determine the reactions to rust (*Melampsora lini*) of 31 fibre flax and 20 linseed varieties [*R.A.M.*, 28, p. 173]. The incidence of infection was assessed by counting the teleutospore pustules on the unbranched sections of the stem and grading them according to size, the degree of susceptibility (ranging from immune to highly susceptible) being expressed in percentages corresponding more or less closely to the extent of the straw surface covered by the pustules.

The fibre varieties Verum, Textilshchick, and Cascade proved to be immune. The linseed types were not, in general, susceptible to the inoculum used, originating in Holland, Sweden, and Denmark. Only slightly susceptible were the fibre varieties Svalöf 0.29 b and 0.200, Formosa, Wiera, Norfolk Mandarin, and American Accession 195. There was a clear-cut connexion between late maturity

and resistance, but the amount of external damage bore no apparent relation to the disintegration of the fibres. The cultivation of resistant varieties is considered to be the most promising method of control in Denmark, where the climate favours both the overwintering of the rust in the teleuto stage and vigorous outbreaks due to uredospore infection. Within the period from 1942 to 1951 epiphytotics of *M. lini* developed from 1943 to 1946, inclusive, all these years being marked by an abnormally heavy June rainfall.

Tomlinson (J. A.). **Root rot of Crocus caused by Pythium ultimum.**—*Plant Path.*, 1, 2, p. 50, 1 pl., 1952.

At the Plant Pathology Laboratory, Harpenden, Herts., *Pythium ultimum* was isolated from diseased Remembrance crocus roots received from Leeds in 1950. The corms were healthy but the roots were dull and watersoaked with bright orange lesions up to a $\frac{1}{4}$ in. long, several having been shortened by the orange rot. Mycelium and oospores were found in affected areas. When disks from a culture of the *P. ultimum* isolate were inserted in the soil near and below healthy rooted corms in pots severe root rotting had developed after 30 days and the pathogen was reisolated. Queen of the Blues, Vanguard, King of the Striped, Yellow Mammoth, and White Mammoth also developed extensive root rot when inoculated.

Asen (S.) & Davidson (O. W.). **Boron requirement of greenhouse Roses.**—*Proc. Amer. Soc. hort. Sci.*, 60, pp. 439–448, 1952. [Received April, 1953.]

In experiments at Rutgers University, New Brunswick, New Jersey, both flower production of roses and their quality were markedly improved by the addition of 0·25 p.p.m. boron to the substrate (white quartz sand watered with a nutrient mineral solution). The higher of two concentrations of major salts, high calcium, and root injury all decreased the amount of boron in the tissues, whereas high potassium and the lower salt concentration increased it. An excellent correlation was found to exist between the boron concentration of the uppermost five-foliate leaf on stems having flower buds just beginning to show colour and the concentration of boron available to the plant. Values below 10 p.p.m. were considered deficient and 10 to 20 p.p.m. sub-optimal.

The results of a survey throughout the United States to determine the boron status of greenhouse-grown rose plants indicated that the addition of boron to rose soils in amounts adequate to offset losses from leaching and plant growth is warranted.

Stuart (N. W.), Skou (W.), & Kiplinger (D. C.). **Further studies on causes and control of leaf scorch of Croft Easter Lily.**—*Proc. Amer. Soc. hort. Sci.*, 60, pp. 434–438, 1952. [Received April, 1953.]

Co-operative experiments at the Plant Industry Station, Beltsville, Maryland, and Ohio State University, Columbus, lent further support to the theory that leaf scorch of Croft Easter lilies [*Lilium longiflorum*] is due to unbalanced nutrition [*R.A.M.*, 32, p. 127]. It is most severe in very acid soils but can be largely overcome with applications of calcium. In less acid soils the addition of nitrogen alone often tended to reduce the amount of scorch [loc. cit.] but the role of nitrogen in this connexion is not clear.

Seeley (J. G.) & De Cardona Velasquez (Dolores). **The effect of fertilizer applications on leaf burn and growth of Croft Lilies.**—*Proc. Amer. Soc. hort. Sci.*, 60, pp. 459–472, 2 figs., 1952. [Received April, 1953.]

At Pennsylvania State College, Croft lily bulbs (*Lilium longiflorum*) from six sources were grown in soil with various fertilizer treatments. The amount of leaf

scorch [see preceding abstract] decreased when nitrogen fertilizers were mixed with a low-nutrient potting soil or applied during forcing. It was eliminated completely by some nitrogen fertilizer treatments, in the course of which the soil pH decreased from 6·6 to between 4·5 and 4·9 [cf. loc. cit.]. Boron and magnesium solutions increased the amount of leaf scorch.

Beale (J. H.) & Beale (Helen P.). **Transmission of a ringspot-virus disease of Syringa vulgaris by grafting.**—*Contr. Boyce Thompson Inst.*, 17, 1, pp. 1–6, 2 figs., 1952.

Ring spot disease of lilac (*Syringa vulgaris*), present in Europe [*R.A.M.*, 14, p. 462; 30, p. 520; 31, p. 328], was first observed in New York State in the vicinity of Yonkers in 1949. In 1952 it was found at Rochester and also in the arboretum of Wisconsin University. During 1950 a single infected bush was reported at Leyburn, England, and another at Voss, Norway.

The leaves bear light green, wavy lines forming ring-like lesions in the veinlet areas and frequently a single band right across the blade or an oak-leaf pattern. Although the bushes at Yonkers were heavily infected, an occasional twig remained apparently healthy. The shape and texture of the leaves and the flowers were unaffected.

In January, 1952, 14 grafts were made between healthy Mlle Mélide Laurent and Paul Deschanel and infected plants. The virus was transmitted in six out of nine cases where the healthy varieties were grafted on to infected stocks. In two out of three cases it was transmitted from an infected scion to a healthy Paul Deschanel stock and in one out of three cases by budding.

Of over 100 varieties examined during the summer of 1952 in Highland Park, Rochester, only Ruhm von Horstenstein, Pyramidalis, Eden, Professor E. Stoekhardt, and Mrs. E. van Nes were infected. The varieties affected in Wisconsin, all obtained from the same source, were Desfontaines, Gloire des Moulins, Hugo Koster, and Président Grévy. Another bush of the last-named variety from a different source planted about 20 ft. from the infected one remained healthy. Gloire des Moulins growing at Rochester was also unaffected. This uneven distribution indicates that the virus probably originated in Europe and is perpetuated in infected stocks by vegetative propagation. Care should therefore be taken in the selection of propagating material.

Moore (F. Joan). **Some powdery mildews on ornamental plants.**—*Plant Path.*, 1, 2, pp. 53–55, 1952.

The occurrence is recorded of some powdery mildews on ornamental plants in the British Isles, including *Sphaerotheca fuliginea* on *Calendula officinalis* [cf. *R.A.M.*, 13, p. 127], *Erysiphe polygoni* on *Statice chiloensis* and *Limonium vulgare*, *Podosphaera oxycanthae* var. *tridactyla* on cherry laurel (*Prunus laurocerasus*) [cf. ibid., 29, p. 318], and (?) *E. polyphaga* [ibid., 25, p. 236; 31, p. 329; 32, p. 215] on *Kalanchoe blossfeldiana*.

Beaumont (A.). **Primula diseases.**—*Gdnrs' Chron.*, Ser. 3, 133, 3457, pp. 131–132, 1953.

Brief notes are given on the symptoms, cause, and control of the principal diseases affecting *Primula* spp. in England.

Mooi-Bok (M. B.). **Het Thielaviopsis-wortelrot van Lathyrus odoratus L. (bodemmoeheid).** [The *Thielaviopsis* root rot of *Lathyrus odoratus* L. (soil sickness).] —*Meded. plziektk. Onderz., Wageningen*, 48, 71 pp., 7 figs., 9 graphs, 1952. [English summary.]

The symptoms of 'soil sickness', which may cause heavy losses in Dutch sweet

pea crops, are very variable. In severe cases delayed growth is a conspicuous feature and the plants do not exceed 15 to 30 cm. in length. The small, drooping leaves soon turn yellow and a wedge-shaped, brown discoloration, about 5 cm. long, develops at the stem base. The roots are dark brown, with longitudinal fissures, and the penetration of secondary fungi, following initial invasion by *Thielaviopsis basicola* [cf. *R.A.M.*, 32, p. 296], the agent of the disease, results in their truncation and disintegration. The formation of adventitious roots retards the death of the plants, which is preceded by a gradual wilting. Many plants harbour the pathogen without showing any very noticeable external symptoms. The roots of plants showing mild symptoms may be roughened and bear rusty-brown patches, on which the typical chlamydospores are produced in clusters. Sections through diseased roots in the incipient stage of infection reveal mycelium and chlamydospores, accompanied by a light to dark brown, gummy substance, in the intercellular spaces, the adjacent cell walls being of a similar colour. The mycelium traverses fairly long distances in the intercellular spaces, but was never detected within the endodermis or central cylinder even of heavily infected plants. The infected area is often surrounded by meristematic tissue.

Although various authors have recorded *T. basicola* on sweet pea, it has not previously been regarded as the cause of soil sickness. The symptoms induced by the fungus on other hosts, including tobacco, closely resemble those on sweet pea. The name of '*Thielaviopsis* root rot' is proposed as more apt than the commonly used 'black' or 'brown root rot' or merely 'root rot'.

The fungus grew well on potato dextrose and oatmeal agars and in a potato dextrose solution. Perithecia did not develop in culture, though they were found in the naturally infected roots. Other ornamental hosts of *T. basicola* in Holland include *Cyclamen*, China aster, *Primula obconica* [ibid., 12, p. 513], poinsettia [*Euphorbia pulcherrima*: ibid., 12, p. 514], *Cypripedium*, and *Viola* [ibid., 16, p. 813], a matter of importance in connexion with crop rotation. The minimum, optimum, and maximum temperatures for the growth of the sweet pea strain of *T. basicola* were 5°, ± 25° [cf. ibid., 5, p. 635], and 39° C. The pathogen thrives over a pH range from 5 to 6·5 and at a soil-moisture level of about 100 per cent. [cf. ibid., 15, p. 536], which likewise favour the growth of the host, so that a change in the hydrogen-ion concentration of the soil offers no practical solution of the control problem. The chlamydospores produced on sweet pea roots, which remain in the soil when the plants are lifted after flowering, are a serious source of infection for the next year's seedlings. Thorough clearance of the old crop, therefore, is an important precaution against recontamination through the soil.

Proof of the pathogenicity of *T. basicola* to sweet peas was furnished by the results of inoculation experiments with pure cultures and in infested soil. When soil not previously cropped with sweet peas was mixed with soil used for this purpose in the previous year, the severity of the disease increased with rising percentages (up to 100) of infested material. For instance, the number of flower stalks per plant of the Daphne and Sunray varieties fell from 10·3 and 6·8, respectively, in healthy to 5·9 and 3, respectively, in completely infested soil and the total length of the plants from 157 and 129 cm. to 100 and 90, respectively, while the percentages of bud drop rose from 7·3 and 8·4 to 18 and 22·4, respectively. Similar results follow the repeated cultivation of sweet peas on the same site. For example, in 1948 the percentage of flower stalks of Gigantic decreased by 43 when grown for the second time, and that of Welcome for the third by nearly 60. At the same time the length of the flower stalks fell progressively as the season advanced.

The only successful methods of soil disinfection among several tested were five minutes' steam sterilization at 55° and 5 per cent. formalin treatment (10 l. per sq. m.), both applied 12 days before setting out the seedlings. Apart from a four-

year crop rotation, cultural methods are considered unlikely to give effective control of *T. basicola*.

Jensen (D. D.). **Virus diseases of Orchids.**—*Aust. Orchid Rev.*, 18, 1, pp. 23–24, 1953.

This paper on orchid virus diseases in California has already been noticed from another source [*R.A.M.*, 32, p. 129].

Safeeulla (K. M.). **Morphological and cytological studies of Albugo species on Ipomoea hederacea.**—*Curr. Sci.*, 21, 10, pp. 287–288, 3 figs., 1952.

The author describes a new variety of *Albugo evolvuli* (*Bot. Gaz.*, 110, pp. 487–491, 1949), *A. evolvuli* var. *mysorensis*, which was collected on the leaves and stems of *Ipomoea hederacea* near Bangalore, India. The sporangia formed in pustules on the leaves lack equatorial thickening. The sex organs develop inside large galls (2 to 2·5 in. in diameter) on the stem.

Ford (A. J.). **Root and crown rots of African Violets.**—*Afr. Violet Mag.*, 6, 3, pp. 20–28, 8 figs., 1953.

During a 10 months' study at George Washington University, Washington, D.C., on root and crown rots of African violet [*Saintpaulia* spp.] and their possible causes, of the 56 isolates from 274 obtained and identified, selected for their pathogenicity in trials on the cuttings in water in test tubes, three belonged to *Fusarium oxysporum* and six to *Phytophthora* sp. In further tests on cuttings in soil, agar, and vermiculite the latter was the most efficient destroyer, invading the plant up to the margin of the leaf blade in 48 hours to one week after inoculation, and causing 100 per cent. infection, while the former was most frequently isolated, being obtained from all parts of the plant, progress up the plant, however, being much slower. Other fungi frequently isolated were *Rhizoctonia* [*Corticium*] *solani* (46 times), *Pythium* (16), and *Alternaria* (10). All the plants inoculated with *Erwinia carotovora*, *E. atroseptica* [*E. phytophthora*], and *Pseudomonas solanacearum* rotted. In the case of the first two the plants were wound inoculated in the petiole and the rot, spreading up and down the plant, was confined to the area of incision, where the plant finally broke off. With *P. solanacearum*, a broth of which was poured over the roots, the rot spread up the petiole to the leaf blade, ultimately destroying the whole plant. Inoculations with soil nematodes (*Meloidogyne* spp.) and fungi together showed that they enable fungi, unable to enter the plant alone, to cause rotting.

Ruizhkova (Mme Z. F.). Фузариозное увядание Люцерны. [*Fusarium* wilt of Lucerne.]—Докл. Акад. сельскохоз. Наук Ленина [*Rep. Lenin Acad. agric. Sci.* = *Proc. Lenin Acad. agric. Sci.*], 17, 10, pp. 13–16, 1952. [Received April, 1953.]

Studies at the Voronezh Plant Protection Station, U.S.S.R., have shown that lucerne wilt, which has been spreading for some years in the district, is due to species of *Fusarium*, in particular *F. oxysporum* var. *medicaginis* [*R.A.M.*, 31, p. 148]. Many of these *Fusarium* spp. were shown to be pathogenic to weeds (*Rep. Lenin Acad. agric. Sci.*, 55, 7, 1947) in lucerne fields, which should be strictly controlled. Observations of disease development covering two seasons have revealed that lack of soil moisture, particularly in the first year, results in greater wilting. Measures for maintaining soil moisture should be undertaken.

Sterten (A. K.). **Melding om undersøkelser over engvekstenes overvintring. I. Undersøkelsene i tiden fra 1949 til våren 1951.** [Survey of investigations on the overwintering of pasture crops. I. Investigations during the period from

1949 until the spring of 1951.]—*Forsk. Fors. Landbr.*, 3, 1, pp. 31–47, 4 figs., 1952. [English summary.]

Some of the information in this survey of the investigations on the overwintering of pasture crops sponsored by the Norwegian Plant Protection Institute and conducted in collaboration with H. Ekstrand has already been presented from another source [*R.A.M.*, 30, p. 364].

Sclerotinia trifoliorum [see next abstract; cf. ibid., 31, p. 125] was observed on clovers in all the regions covered, among which special attention was paid to Jaeren in western Norway, the central and upland parts of the eastern area, and the south, while a more cursory inspection was made of Sogn and Hordaland in the west, the south-east and south-west of the eastern district, and Trøndelag. *Typhula itoana* occurred in the east and in Trøndelag, as also did *T. borealis*, the latter mostly at higher altitudes. *S. borealis* was detected only in the mountains of the east and Trøndelag. Red clover and lucerne were attacked by both *S. trifoliorum* and *T. borealis*. The former species throve on the luxuriant second crops produced in the autumn, when humid conditions favoured its development, while the absence of ground frost promoted severe infection by the latter, which was demonstrated under a snow cover 1 m. in depth. In some of the localities visited up to half the stands of clover were destroyed by *S. sclerotiorum*. Hay grasses, e.g., *Alopecurus pratensis* and timothy [*Phleum pratense*: ibid., 31, p. 556], and autumn-sown cereals sustained heavy damage from *T. borealis* and *S. borealis*, the most destructive of the pathogens encountered. Among the sclerotia in one collection from clover were those of *Mitrula sclerotiorum* [cf. ibid., 25, p. 455].

Røed (H.) & Støen (M.). **Kløverråte og Kløverål, to aktuelle Kløversjukdommer.** [Clover rot and Clover eelworm, two topical Clover diseases.]—Reprinted from *Norsk Landbr.*, *1953*, 4, 10 pp., 3 figs., 1953.

During a survey of the clover stands in 125 meadow lots in eastern Norway from September to October, 1951, and May, 1952, *Sclerotinia trifoliorum* [*R.A.M.*, 32, p. 22 and preceding abstract] was detected in 91 (73 per cent.).

Harrison (J. R.). **A serious rootlet rot of Alsike Clover.**—Abs. in *Phytopathology*, 42, 9, p. 514, 1952.

A destructive rootlet rot of alsike clover (*Trifolium hybridum*) is reported from central Oregon, where it frequently causes severe damage or death of the plants in two-year-old fields under the favourable growing conditions of late spring. In severe cases all the rootlets may be killed. Several species of *Fusarium* and other fungi have been encountered in diseased material, but an unidentified *Phoma* consistently predominated among the isolates from rootlet tissue, and in soil inoculations it was the only organism to induce the typical symptoms of the rootlet disease, unwounded primary and lateral roots being rarely infected.

Hanson (E. W.) & Hagedorn (D. J.). **Red Clover, a reservoir of legume viruses in Wisconsin.**—Abs. in *Phytopathology*, 42, 9, p. 467, 1952.

Red clover was shown by an extensive survey in Wisconsin from 1949 to 1951, inclusive, to be a natural host of many viruses, among those repeatedly isolated being red clover vein mosaic [*R.A.M.*, 31, p. 98], pea mosaic, bean yellow mosaic, Wisconsin pea streak [ibid., 30, p. 300], alsike mosaic, and lucerne mosaic in that order of prevalence, besides several not yet identified. Several of the viruses listed may be very destructive to canning peas.

Gerdemann (J. W.). **A new root rot of Red Clover.**—Abs. in *Phytopathology*, 42, 9, p. 466, 1952.

A hitherto unrecorded fungus commonly found associated with red clover root

rot in Illinois proved pathogenic on its own host and lucerne in greenhouse inoculation tests. It penetrates directly into the roots of plants grown in infested soil, causing a brown to black root rot and damping-off of seedlings. Brown acervuli develop on susceptible plants and various kinds of sterilized material. The conidia are hyaline, uniseptate, and biciliate, and small, black sclerotia are produced on the hosts, natural media, and potato dextrose agar. The fungus has not yet been definitely identified. The conidia resemble those of *Discosiella*, the fruit body of which, however, is described as a pycnidium. The pathogen appears to be closely allied to *Pseudodiscosia*, though differing in the number of conidial septations and colour of the acervulus.

LARGE (E. C.). **Surveys for choke (Epichloe typhina) in Cocksfoot seed crops, 1951.**—*Plant Path.*, 1, 1, pp. 23–28, 1 fig., 1 graph, 1952.

An extensive survey for choke (*Epichloe typhina*) [*R.A.M.*, 13, p. 169; 22, p. 210] in cocksfoot (*Dactylis glomerata*) was made in 1951 on 644 seed crops of the Aberystwyth strains S.37, S.26, and S.143 covering 10,000 acres and widely scattered over all the seed-growing areas of England and Wales. The crops were entered for inspection under the Certification Scheme for Aberystwyth strains and reports were made by Grassland Officers and District Officers during their normal inspections for certification in late May and early June, when the plants were in full growth and coming into head. The prevalence of both choked tillers and vegetative tillers was assessed according to the following scale: absent, occasional, frequent (up to about 10 per cent. in most quadrats), and severe (over 10 per cent. in most quadrats).

In addition, an intensive survey of samples of 86 crops was made by plant pathologists, who examined ten 1-ft. lengths of drill in each field, equally spaced along the field diagonals.

The two surveys gave the same general indications: that with a few very significant exceptions choked tillers were absent from first-year stands and present in about half the second-year stands and in most of those in the third and later years. In the pathologists' survey the proportion of crops with 10 per cent. or more of choked tillers ranged from 9 per cent. in the second year to 76 per cent. in the fifth and sixth. The inspectors' recordings of 'frequent' or 'severe' rose from 10 per cent. in the second year to 58 per cent. in the fifth and sixth. There was no indication of any appreciable difference between the mean incidence and the severity of choke in the different provinces, or of any difference in susceptibility between the three strains.

The growth of plants with choke tended to be more luxuriant than those without. There was no correlation between numbers of vegetative tillers and percentage of choked ones. For the group of crops averaging 51 per cent. choked tillers, the mean number of flowering tillers per ft. was 29·3, compared with 62 for uninfected crops. The survey thus indicated that the percentage of choked tillers in a field may be a fair measure of the reduction caused by the disease in the number of seed heads to be harvested. The surveys are being continued.

ZACHA (V.). **Příspěvek k mykopathologii našich travin.** [A contribution to the mycopathology of our grasses.]—*Sborn. čsl. Akad. zeměd.*, Řada B [*Ann. Acad. tchécosl. Agric.*, Ser. B], 25, 1, pp. 49–60, 17 figs., 1952. [Received April, 1953. Russian and English summaries.]

This paper, the first part of a monograph on grass fungi in Czechoslovakia, is based on a field survey, particularly of the pedigree strains of grasses at the Research Stations, carried out in 1951. The most important fungi attacking grasses are *Passalora graminis* [cf. *R.A.M.*, 31, p. 460] and *Erysiphe graminis* [ibid., 29,

p. 611] on various grasses, *Ustilago perennans* on *Arrhenatherum elatius* [ibid., 27, p. 125], and *Septoria oxyspora* on *Trisetum flavescens*. Also included are *Epichloe typhina* [see preceding abstract] on *Agrostis alba* and *Mastigosporium album* [ibid., 30, p. 584] on *Alopecurus pratensis* and *Dactylis glomerata*.

Graham (J. H.). **Purple leaf spot of Orchard Grass.**—Abs. in *Phytopathology*, 42, 9, p. 466, 1952.

Purple leaf spot (*Stagonospora maculata*) is prevalent on orchard grass [*Dactylis glomerata*] in the north-east of the United States, often killing entire blades and attacking other aerial organs. The initial phase is marked by minute, watery spots, which develop into subelongated, purplish-black lesions, 2 to 4 mm. in length. In greenhouse inoculations on 12 species representing 10 genera of forage grasses, only *D. glomerata* and *D. aschersonia* were susceptible. Most isolates produced pycnidia on soy-bean agar and sterile bird's foot trefoil stems. Optimum temperatures for mycelial growth and spore germination, viz., 25° and 22° C., respectively, often occur during summer nights in Pennsylvania. Penetration (primarily direct) and a measure of infection occurred within six hours, appressoria usually being formed between the epidermal cells. Primary infection in the spring is effected by pycnidiospores from dead leaves and culms.

Kirchner. **Die Berechnung der Spritzbrühenmenge bei der Winterspritzung der Obstbäume.** [The calculation of spray consumption in the winter spraying of fruit trees.]—*NachrBl. dtsch. PflSchDienst., Berl.*, 6, 12, pp. 235–236, 1952.

Experiments have shown that in dormant applications on fruit trees the bulk of the spray mixture is absorbed by the crown. Very helpful guidance as to the amounts required for crowns of varying diameter may be obtained by a method of the Wolfen dye factory, in which the multiplication of the crown height by a factor based on the following scale gives the appropriate number of litres: crown diameter 1 to 2 m., factor 1; 3 to 4 m., 1·5; 5 to 6 m., 2; 7 to 8 m., 2·5; 9 to 10 m., 3; 11 to 12 m., 3·5; and 13 to 14 m., 4. For half-standards and bush fruits the addition of ½ to 1 l. or at most 2 l. is recommended.

Croxall (H. E.), Gwynne (D. C.), & Jenkins (J. E. E.). **The rapid assessment of Apple scab on leaves.**—*Plant Path.*, 1, 2, pp. 39–41, 1 fig., 1952.

A key is given for the rapid assessment of apple scab [*Venturia inaequalis*: *R.A.M.*, 32, p. 82] on leaves. Five runs of branches, each run consisting of a main branch with all its laterals, sub-laterals, and spurs, are chosen at random as sampling units for each tree and the scab percentage for the whole tree is reckoned as follows: one or two infected leaves in occasional units indicates 0·01, or in every unit 0·05 per cent.; up to five small spots on one quarter of the leaves in each unit 0·25, or on half the leaves 0·5; the majority of the leaves infected, a few having a quarter of their area covered with spots, 1; almost every leaf infected, a quarter of them 25 per cent. covered, 5; and with every leaf infected, half of them being (a) 25 per cent., (b) 50 per cent., or (c) almost entirely covered, 10, 25, and 50, respectively. Where possible, records should be made on ten trees of each variety, and if only a single observation is made it should be about three to four weeks after petal-fall. The scab incidence on fruitlets should be recorded as nil, slight, moderate, or severe, and the general condition and management of trees noted.

The results of scab assessments made by the rapid visual method and a research method [ibid., 26, p. 63] were in relatively close agreement, indicating that the former, though not quite as accurate, may be used to detect major differences in a spraying trial.

Burrell (A. B.). **Cumulative effects of lime sulfur and ferrox flotation sulfur on McIntosh Apple trees.**—Abs. in *Phytopathology*, 42, 8, pp. 463–464, 1952.

The following protectant treatments were applied over a ten-year period to McIntosh apple trees in a cool climate [? Champlain Valley, New York], using 14 replicates for each treatment: (a) lime-sulphur throughout the season, (b) ferrox flotation sulphur throughout, (c) lime-sulphur until the end of petal-fall, followed by flotation sulphur, and (d) the same reversed. The number of applications per annum averaged 6·6. Slightly better control of scab [*Venturia inaequalis*] resulted from (a) and (c) than from the other schedules, while the highest yields were obtained from (b), followed by (c). With the restoration of uniform spraying after the conclusion of the experiment the yields of the groups formerly receiving differential treatments soon became equal.

Keitt (G. W.) & Boone (D. M.). **Additional gene pairs conditioning pathogenicity in Venturia inaequalis.**—Abs. in *Phytopathology*, 42, 9, p. 480, 1952.

Three more gene pairs conditioning pathogenicity of wild-type lines of *Venturia inaequalis* to apple leaves were discovered in further studies on this subject [at the Wisconsin Agricultural Experiment Station: *R.A.M.*, 32, p. 318], bringing the known total to six. The three new gene pairs are tentatively named $Haralson_2$, Hyslop, and Grimes Golden, each after the first differential variety found for it. In each case one allele induces typical sporulating lesions and the other flecks with little or no sporulation. Only for $Haralson_2$ could the map distance of the locus from the centromere be determined, the data from eight isolates from each of 43 asci indicating that the locus appears to be situated approximately 12 cross-over units from its centromere.

Krause (W. G. C.). **Stony pit in Pears.**—*Comm. Gr.*, *1953*, 2990, pp. 803–804, 1 fig., 1953.

This is a brief account of the pear stony pit virus in England [*R.A.M.*, 30, pp. 46, 167]. Because of its inconspicuousness it tends to be overlooked despite the fact that it is very widespread and requires serious attention. Among the susceptible varieties are Beurré Clairgeau, Triomphe de Vienne, and William's Duchess. The use of virus-free propagation material appears to offer the only possible means of control at present.

Brooks (R. M.) & Olmo (H. P.) **Register of new fruit and nut varieties. List 7.**—*Proc. Amer. Soc. hort. Sci.*, 60, pp. 497–504, 1952. [Received April, 1953.]

In this further list of new fruit and nut varieties bred in the United States [cf. *R.A.M.*, 31, p. 333] it is stated that the blueberry [*Vaccinium* spp.] varieties Angola (North Carolina 246) and Ivanhoe respectively resist and tolerate canker [*Physalospora corticis*: ibid., 30, p. 525]. Starking Delicious plum is highly resistant to bacterial canker and leaf spot [*Xanthomonas pruni*: ibid., 26, p. 18].

Stoll (K.). **Das Kirschbaumsterben im Baselland. 4. Mitteilung. Über die Verbreitung und die Erscheinungsformen der Krankheit im Jahre 1951.** [The dying-off of Cherries in the Basel area. Note 4. On the distribution and symptomatology of the disease in the year 1951.]—*Annu. agric. Suisse*, 53, 3, pp. 255–278, 4 figs., 2 diags., 1952. [French summary.]

Further information is presented on the Pfeffinger virus disease of cherries in the Basel region of Switzerland, much of which has already been noticed from another source [*R.A.M.*, 31, p. 560; cf. 32, p. 199].

Thung (T. H.). **Herkenning en genezing van enige virusziekten.** [Recognition and cure of some virus diseases.]—*Meded. Dir. Tuinb.*, 15, 8, pp. 714–721, 2 figs., 1952. [English summary.]

The viroses of raspberries, cherries, and strawberries occurring in Holland could not be diagnosed by the methods prescribed by KenKnight [*R.A.M.*, 31, p. 68], Lindner *et al.* [ibid., 31, p. 127], and Hino (in a paper presented at the Botanical Congress, Stockholm, in 1950). Rumley and Thomas's claim for the control of carnation mosaic virus by chemical treatment [ibid., 32, p. 144] has not been substantiated by the writer's experiments. On the other hand, leaf roll virus was eliminated from the tubers of some Dutch potato varieties by the heat treatment of Kassanis [ibid., 29, p. 168], which at the same time, however, induced two types of mutation, one expressed merely by slight stunting, while the other was characterized by lumpiness and yellow spotting of the leaves. *Rubus* stunt virus of raspberry [ibid., 31, p. 288] was cured by 1½ to 2 hours' exposure of the canes to a temperature of 45° C.

Cadman (C. H.) & Harris (R. V.). **Leaf curl, a virus disease of Raspberries in Scotland.**—*J. hort. Sci.*, 27, 3, pp. 201–211, 2 pl., 1 diag., 1952.

Norfolk Giant raspberry stools in the field in Scotland affected by leaf curl virus [*R.A.M.*, 28, p. 340; 31, p. 192], believed to be etiologically distinct from North American leaf curl [ibid., 6, p. 675; 10, p. 195; 30, p. 15] and yellow blotch curl [see next abstract; ibid., 24, p. 137], were recognizable in early spring by the fact that the fruiting canes were either dead or producing a large proportion of distorted fruiting laterals. In severe cases the laterals were reduced to short, rosetted growths of small, curled, brittle leaves which prematurely exposed the flower buds, these last usually dying. Less badly affected laterals grew out and produced flowers and fruit, but the leaves were generally distorted by conspicuous yellow or necrotic blotches, the stems being thick and brittle. Young canes from plants affected the previous season were stunted and produced glossy green, tightly down-curled leaves, which sometimes displayed diffuse chlorosis. These abnormalities are associated with necrosis of the phloem and collapse of the parenchymatous bark tissue. Towards the end of the season the young canes become necrotic at the tip and die back to the basal buds. The whole plant usually succumbs during the following winter, though it may survive to produce a crop of stunted, curled canes.

The results of grafting to healthy Norfolk Giant plants indicated that the disease usually has a long incubation period. Appearance of symptoms during the season of inoculation implies that it took place at the beginning of the growth period. Newly infected plants are seldom found in the field after mid-July, though plants appearing healthy after this date may develop chronic leaf curl in the succeeding spring. For this reason grubbing of visibly affected stools is only of limited use in fruiting plantations. Transmitted by grafting [loc. cit.], the virus caused a necrotic leaf curl in Baumforth's Seedling B, a lethal yellow blotch in Preussen, Enterprise, Jewel, and Notable, and a non-lethal chlorosis of Lloyd George, St. Walfried, and Malling Promise. Temporary masking of symptoms on Norfolk Giant and Baumforth's B occurred in warm weather conditions (at or above 65° to 66° F.). Response to temperature variations is more marked in plants grown in partial shade, leaves responding only when actively expanding.

Careful surveys since 1945 have established that large-scale outbreaks may occasionally develop quite suddenly. The disease has frequently appeared in stocks known to be free from infection, and in plantings remote from other commercial stocks and varieties. Symptoms have never been observed on wild raspberries, nor has the virus been detected by grafting in these or other wild *Rubus*

spp. In only one instance was infection traced to a tolerant variety, and even this source was of doubtful significance. Once the virus is established in a plantation of Norfolk Giant the number of infected plants is approximately doubled every year. It is concluded that an insect vector exists, though it has not yet been found.

Cadman (C. H.) & Harris (R. V.). **A lethal virus disease of Lloyd George Raspberry in Scotland.**—*J. hort. Sci.*, 27, 3, pp. 212–214, 1 pl., 1952.

In 1943 and 1944 widespread death and failure of canes occurred in plantations of Lloyd George raspberries on two farms in the Coupar Angus district of Perthshire. The fruiting canes were necrotic and the young canes stunted, with coarse, circular or irregular yellow blotches on the lower leaves. Affected leaves were not markedly down-curled and the symptoms were masked on foliage produced in summer, reappearing on leaves produced in late August and September. Affected plants seldom survived for more than one growing season. Closely similar symptoms occurred on plants of Burnetholm Seedling growing near one of the affected areas. Graft transmissions produced mosaic symptoms of a hitherto unrecorded type on Norfolk Giant, consisting of small, irregularly shaped and distributed, intervenal chlorotic spots on the leaves. On Baumforth's Seedling B and St. Walfried severe chlorotic spotting and down-curling developed on the leaves, and the canes were stunted. Plants of Malling Promise were dwarfed with a general indistinct chlorosis of the leaves. The virus, which was transmitted by *Amphorophora rubi*, is provisionally named yellow blotch virus as the disease resembles North American yellow blotch curl [see preceding abstract] in some respects.

Jeffers (W. F.) & Scott (D. H.). **Significance of physiologic races of Phytophthora fragariae Hickman in breeding Strawberries for resistance to the red stele disease.**—Abs. in *Phytopathology*, 42, 9, p. 468, 1952.

The differential varietal response of strawberries growing in soils infested with red stele [red core] (*Phytophthora fragariae*) [*R.A.M.*, 29, p. 461; 32, p. 323] in Maryland demonstrated the existence of at least three physiologic races within the species. In tests on 14 varieties and selections with five isolates of the fungus from England [ibid., 31, p. 70] at least four races were distinguished, one of which, at any rate, differs from those occurring in Maryland. Resistance to several physiologic races has been incorporated into some selections by crossing plants resistant to single races. Selections combining resistance to *P. fragariae* with superior fruit and foliage withstanding infection by leaf spot [*Mycosphaerella fragariae*: see next abstract], leaf scorch [*Diplocarpon earliana*], and powdery mildew [*Sphaerotheca humuli*] have been released to growers for testing.

Smith (H. C.). **Strawberry fungous disease in New Zealand.**—*Rep. Sci. Congr. roy. Soc. N.Z., 1951*, pp. 47–48, 1952.

In these notes on fungal diseases of strawberry in New Zealand it is stated that red core (*Phytophthora fragariae*) [see preceding abstract] is most severe in poorly drained areas on heavy soils during winter; the ground will remain infected in the absence of strawberry plants for ten years. The Prolific and Perle de Prague varieties are immune. Black root rot, due to *Fusarium culmorum*, *Pachybasium hamatum* var. *candidum* [? *P. candidum*: *R.A.M.*, 14, p. 180; 28, p. 180], and *Pythium* spp., is most severe in summer on heavy, wet soils, especially in southern areas, where strawberries are grown for several years in succession. *Verticillium* wilt (*V. dahliae* and *V. albo-atrum*) [cf. ibid., 31, pp. 69, 561] causes heavy losses only when strawberries follow several potato crops. Leaf spot (*Mycosphaerella fragariae*) [C.M.I. map No. 110] is seldom severe in areas of low annual rainfall, such as Canterbury and Central Otago. Prolific, Captain Cook, and Perle de Prague

are partly resistant [cf. *R.A.M.*, 27, pp. 28, 176, and preceding abstract]. Powdery mildew (*Sphaerotheca humuli*) [cf. ibid., 31, pp. 246, 248] is most prevalent in drier districts, such as Nelson, Canterbury, and Central Otago. Leaf blight (*Dendrophoma obscurans*) [cf. ibid., 32, p. 25] occurs only round Auckland.

Trioreau (P.). **Nouvelle contribution à l'étude des maladies à virus du Fraisier.** [A new contribution to the study of the virus diseases of Strawberry.]—*Jardins de Fr.*, Sér. 7, 7, 3, pp. 68–78, 1 fig., 1 diag., 1953.

The author briefly reviews and discusses the results of research on strawberry virus diseases carried out in England since the war [*R.A.M.*, 28, p. 323; 29, p. 199; 30, p. 523; 31, p. 558; 32, p. 262, *et passim*], the chief points dealt with being the classical symptoms presented by these diseases, plant age in relation to degeneration, insect vectors, non-heritability of infectiveness in the vectors, acquisition time, seasons when insect transmission occurs, infectiveness of old outer leaves in relation to insect transmission, time required for a newly infected plant to become a source of infection for other plants, intertransmissibility of strawberry viruses and viruses of other hosts, and species of *Potentilla* harbouring strawberry viruses in a transmissible form.

Bird (J.) & Adsuar (J.). **Viral nature of Papaya bunchy top.**—*J. Agric. Univ. P.R.*, 36, 1, pp. 5–11, 1 fig., 1952. [Received March, 1953.]

This is an amplified version of information already noticed from another source [*R.A.M.*, 31, p. 339].

Sen (A. B.) & Joshi (K. C.). **Search for organic fungicides : chemical constitution and fungicidal activity.**—*J. Sci. Food Agric.*, 3, 11, pp. 526–531, 1952.

Fungicidal activity in 55 compounds tested for toxicity to ten-day-old cultures of *Aspergillus niger* [*R.A.M.*, 32, p. 201] on a synthetic medium at Lucknow University, India, was generally associated with certain groupings, e.g., brominated amides, esters, alkoxy-substituents, substituted aryloxy-fatty acids, and organomercurials. The two most effective were the mercury salts of *p*- and *m*- ethylphenoxyacetic acid, both of which at 1 in 10,000 caused 86·6 per cent. inhibition of growth after 96 hours; at 1 in 100,000 growth inhibition was 85 and 83·3 per cent., respectively.

Rich (S.) & Horsfall (J. G.). **The relation between fungitoxicity, permeation, and lipid solubility.**—*Phytopathology*, 42, 8, pp. 457–460, 2 graphs, 1952.

At the Department of Plant Pathology, Connecticut Agricultural Experiment Station, series of fungitoxic compounds were selected which should show increased capacity for cell permeation by virtue of increasingly lipophilic side-groupings. This requirement appeared to be fulfilled by the imidazolines (glyoxalidines) [*R.A.M.*, 30, p. 326, *et passim*], and samples of 2-methyl-, 2-amyl-, and 2-tridecyl-2-imidazoline, containing, respectively, 1, 5, and 13 carbons in a side chain in the 2-position, were therefore assayed with conidia of *Stemphylium sarciniforme*.

Dosage-response data were obtained by means of Barratt and Horsfall's depression-slide technique (*Bull. Conn. agric. Exp. Sta.* 508, 1947) [cf. *R.A.M.*, 26, p. 20]. As observed by Wellman and McCallan [ibid., 25, p. 401], potency increases rapidly with length of side chain, and it was further deduced from the experimental results that the slopes for the three selected homologues of 2-imidazoline are essentially parallel; hence the immense disparities in their potency are related to permeation and not to differences in toxic mechanism. Tests with 3, 5-dimethyl-4-nitrosopyrazole, 1, 3, 5-trimethyl-4-nitrosopyrazole, and 1-phenyl-3, 5-dimethyl-4-nitrosopyrazole [ibid., 32, p. 85] corroborated McNew and Sundholm's conclusion

that potency increases with the size of the substituent hydrocarbon group [ibid., 29, p. 107]. Here again the inequalities in fungitoxicity are attributed to differences in permeation. The oil-water partition coefficients are directly related to potency, whereas water solubility is inversely related to it.

The peaks in fungitoxicity reported by Wellman and McCallan for the 2-imidazolines [ibid., 25, p. 401] and by various workers for other series suggest that the most active derivatives must have optimum ratios of lipide to water solubility for maximum penetrations. Cases in which one derivative is most phytotoxic and another most fungitoxic may arise from marked differences in the nature of the lipides of host and parasite. Such differences may also cause divergences in the response of various fungi to the same toxicant.

On the basis of these studies it is proposed that dosage-response data be applied to differentiation between inherent fungitoxicity and permeation. Moreover, their use in identifying the effect of molecular changes on fungitoxicity might be of considerable value in the development of new fungicides.

Veerman (J. A.). **Het nevelen in de bollen- en in de groenteteelt.** [Low-volume spraying in bulb-farming and market-gardening.]—*Meded. Dir. Tuinb.*, 15, 9, pp. 801–804, 2 figs., 1952. [English summary.]

Interest in the application of mechanically atomized sprays is stated to be increasing widely in Holland [*R.A.M.*, 32, pp. 263, 275], and medium-pressure knapsack sprayers with atomizing nozzles have come into general use on bulb farms and in West Friesland. The reasons for their popularity are economy in spray material, saving of labour, simplicity of operation, and low purchase price. The work can be expedited by the use of spray teams. Tulips, potatoes, broad beans, and black currants can be effectively treated by low-volume spraying.

Benlloch Martínez (M.). **El servicio de comprobación y registro de productos fitoterapéuticos. Normas fundamentales y orientaciones prácticas sobre su realización.** [The service for testing and registering plant therapeutants. Basic standards and practical methods for its fulfilment.]—*Bol. Pat. veg. Ent. agríc., Madr.*, 18 (*1950*), pp. 123–128, 1951. [Received 1953.]

After defining the term 'plant therapeutant' the author outlines the objectives of the Spanish service established in 1942 for the registration and testing of therapeutants and the specific requirements for such products, their supplementary ingredients, and types of apparatus with which they are applied.

DuPont I & D seed protectant.—*Seed World*, 72, 4, p. 40, 1953.

A new insect and disease seed protectant, Du Pont I & D (a dustless formulation of arasan with lindane) has been developed by Du Pont, Wilmington, Delaware. It is recommended for use on maize and beans [*Phaseolus vulgaris*], small quantities of seed being treated by hand and larger ones with slurry, and is now being tested for use with other crops.

Takahashi (M.). **A comparative study on the pathogenicity of two species of aquatic Pythium, P. aphanidermatum and P. monospermum.**—*Ann. phytopath. Soc. Japan*, 16, 1, pp. 19–22, 1952. [Japanese, with English summary. Received March, 1953.]

Pythium aphanidermatum and *P. monospermum* were isolated from water in the vicinity of Kyoto, Japan. The optimum temperature for the growth of both species was 34° to 36° C. and the optimum pH for the former was 6 and for the latter 7. In inoculation experiments *P. aphanidermatum* caused damping-off of seedlings of cucumber, vegetable marrow, tomato, eggplant, *Hibiscus manihot*, *Pharbitis* [*Ipomoea*] *nil*, and *Vicia faba* f. *ascendens* [cf. *R.A.M.*, 15, p. 339]. Bean (*Phaseolus*

vulgaris) and rice seedlings were not attacked. *P. monospermum* was not pathogenic to any host. Generally a high soil moisture content increased the susceptibility of seedlings to fungus attack.

Nagai (Y.) & Nukumizu (T.). **The sexuality of Pleurotus.**—*Bull. For. Exp. Sta. Meguro* 57, pp. 1–6, 1952. [Japanese, with English summary.]

Studies in Japan demonstrated that both *Pleurotus spodoleucos* and *P. serotinus* are bipolar, while *P. ostreatus* [*R.A.M.*, 21, p. 273] is tetrapolar. All three species are heterothallic. All attempts to obtain crosses between them were unsuccessful.

Holton (C. S.). **Physiologic specialization and genetics of the smut fungi. II**—*Bot. Rev.*, 19, 4, pp. 187–208, 1953.

This is a summary, supplemented by a bibliography of 134 titles, of the work done during the last 12 years on the physiologic specialization and genetics of the Ustilaginales [*R.A.M.*, 19, p. 731].

Hino (I.). **Specific characteristics or malformation caused by pathogen?**—*J. Jap. Bot.*, 27, 12, pp. 357–361, 3 figs., 1952. [Received March, 1953.]

Malformations caused by pathogens are often mistaken for characters justifying the erection of a distinct variety or form of the host plant. For example, *Phyllostachys reticulata* f. *tanakae* is only *P. reticulata* parasitized on the culms by *Asterinella hiugensis* [*R.A.M.*, 18, p. 205]. Varieties and forms probably erected erroneously because of virus infection in the host are *Eupatorium fortunei* var. *simplicifolium* f. *aureo-reticulatum* [cf. ibid., 20, p. 280], *Quercus glauca* var. *stricta*, *Q. phyllirioides* var. *crispa*, *Nandina domestica* var. *capillaris*, the pathological type of *Euonymus japonicus* var. *aureo-variegatus* [cf. ibid., 6, p. 431; 8, p. 662], the forms of *Bladhia crenata* and *Trachelospermum asiaticum*, and the variety of *Ligularia tussilaginea* with crispate leaves.

Brooks (F. T.). **Plant diseases.**—xii+457 pp., 1 pl., 62 figs., London, Geoffrey Cumberlege, Oxford University Press, 1953. 38*s.* (in U.K. only).

This work is a complete revision of the first edition [*R.A.M.*, 8, p. 186] and is virtually a new book. The introductory chapter on plant pathology (pp. 1–11) has been much expanded; more attention has been given to diseases of trees, and a discussion of the efficacy of the newer fungicides is included. Though mainly concerned with British diseases, the author has attempted to deal to some extent with all important diseases throughout the world. Chapters II (pp. 12–18), III (pp. 19–55), and IV (pp. 56–71), respectively, are devoted to non-parasitic, virus, and bacterial diseases. Chapters V to XX cover different fungus groups, chapter XXI deals with diseases caused by green algae, and the final chapter (pp. 419–426) with fungicides.

Schmidt (M.). **Landwirtschaftlicher Pflanzenschutz.** [Agricultural plant protection.]—395 pp., 148 figs., Berlin, Deutscher Bauernverlag, 1952.

This treatise, addressed primarily to German farmers, comprises a brief general section on the foundations and application of agricultural plant protection and a special part. The latter deals with the protection of individual crops, including opium poppy, tobacco, buckwheat, hops, and basket willows (*Salix* spp.) in addition to cereals, fodders, fibres, and vegetables, under the aspects of predisposing factors for the occurrence of diseases and pests, diagnosis from the symptoms induced, the life-cycles of the pathogens concerned, and special measures of plant hygiene and therapy. There is a list of officially approved plant-protectives and a bibliography of 317 titles.

Lamb (K. P.). **Plant galls.**—*Rep. Sci. Congr. roy. Soc. N.Z., 1951*, pp. 49–52, 1952.

The author classifies plant galls [*R.A.M.*, 29, p. 632] in two groups, plant and animal. The former are further subdivided into those caused by bacteria, fungi, algae, and higher plants. A brief discussion follows on the characteristics of organoid and histioid galls, with a succinct account of the mechanism of gall formation.

Richards (M.). **Saprophytic Cladosporium in Britain.**—*Nature, Lond.*, 171, 4353, pp. 615–616, 1953.

Petri dishes exposed to the outside air at the Asthma and Allergy Research Unit, St. David's Hospital, Cardiff, have regularly yielded two distinct types of *Cladosporium* [*R.A.M.*, 31, p. 619]. One was *C. herbarum* while the other, identified as *C. macrocarpum* [ibid., 13, p. 10], a new record for Britain, was characterized by verrucose, oblong spores mostly 13 to 19 by 7 to 8 μ in short, branched chains of three to five spores. About 50 per cent. or more were unicellular and the rest with two or more cells. The colonies were generally more woolly than the woolly variants of *C. herbarum* and the overgrowth of sterile hyphae was white to grey rather than olive in colour. Considerable numbers of both species were obtained during June, July, and August. Two plates exposed every weekday during 1951 yielded 3,047 colonies of *Cladosporium*, of which 364 (12 per cent.) were *C. macrocarpum* and the rest *C. herbarum*. *C. macrocarpum* has also appeared on plates exposed currently at Cambridge, Edinburgh, Llandough [near Cardiff], Southampton, London, Liverpool, Rothamsted, and Acomb (York).

Urquijo Landaluze (P.). **Medios cooperativos para luchar contra las enfermedades de las plantas en las pequeñas explotaciones agrícolas.** [Co-operative methods for the control of plant diseases in small agricultural holdings.]—*Bol. Pat. veg. Ent. agríc., Madr.*, 18 (*1950*), pp. 133–137, 1951. [Received 1953.]

The author discusses, with some reference to specific pathogens, the means of obtaining efficient and economical control of diseases in small agricultural holdings by loaning equipment and materials from co-operatives or agricultural societies.

Urquijo [Landaluze] (P.) & Rodriguez Sardiña (J.). **Utilidad de la fotografía con luz infrarroja y ultravioleta en fitopatología.** [The usefulness of infra-red and ultra-violet photography in phytopathology.]—*Bol. Pat. veg. Ent. agríc., Madr.*, 18 (*1950*), pp. 29–40, 13 figs., 1951. [Received 1953.]

The authors describe a photographic technique using infra-red [*R.A.M.*, 14, p. 384] and ultra-violet light [ibid., 27, p. 272; 30, p. 468; 31, p. 420] for detecting plant viruses, with reference to results obtained in this field by other workers. Their own results with ultra-violet light are given.

Mandels (G. R.) & Darby (R. T.). **A rapid cell volume assay for fungitoxicity using fungus spores.**—*J. Bact.*, 65, 1, pp. 16–26, 1 fig., 11 graphs, 1953.

A rapid cell volume assay technique based on spore swelling has been developed at the Pioneering Research Laboratories, United States Army Quartermaster Corps, Philadelphia, Pennsylvania, for determining fungistatic and fungicidal or disinfectant properties of various compounds. Use is made of the fact that spores of *Myrothecium verrucaria* [*R.A.M.*, 30, p. 182; 31, p. 569, and next abstract] increase in volume about five times in three hours in a sucrose and yeast extract at 30[°] C., the change being a typical phenomenon of growth as it is accompanied by an increase in dry weight. The swelling is influenced markedly by environmental conditions. Volume increase is measured in haematocrit tubes after centrifugation.

The assay takes only three hours and aseptic precautions are unnecessary. Standard suspensions do not deteriorate even after nine days' storage under refrigeration. Lyophilization of aliquots can be used to provide material over more extended periods.

A brief survey of the spores of other fungi revealed some that might be of use for this technique.

Curtis (P. J.), Hemming (H. G.), & Jefferys (E. G.). **Humicolin, an antifungal substance produced by Aspergillus humicola.**—*Trans. Brit. mycol. Soc.*, 35, 4, pp. 263–267, 1952.

At the Butterwick Research Laboratories, Welwyn, Herts., *Aspergillus humicola* [*R.A.M.*, 13, p. 471] isolated from limestone-cave soils in Great Britain yielded a substance toxic to the growth of *Candida albicans* and to spore germination of *A. niger*, *A. terreus*, *Fusarium caeruleum*, *Myrothecium verrucaria* [see preceding abstract], *Penicillium expansum*, *P. gladioli*, *Stemphylium* sp., *Trichoderma viride*, and other fungi, and *Bacterium globiforme*. It inhibited germination of *Botrytis allii* spores at 1 μgm. per ml. In surface cultures the best titres were obtained in nitrate-10 per cent. glucose media. The active substance was extracted from culture filtrates by activated charcoal and eluted with carbon tetrachloride. The petrol-ether soluble fraction of this eluate, a yellow oil, is named humicolin. It is moderately stable in aqueous solution at pH 3·5 to 4·5 but is rapidly inactivated above this.

Evans (E.) & Gottlieb (D.). **The role of gliotoxin in the soil.**—Abs. in *Phytopathology*, 42, 9, pp. 465–466, 1952.

Of a number of organisms tested [at the University of Illinois], *Trichoderma viride* in Raulin-Thom medium in shake flasks produced the maximum yield of gliotoxin [*R.A.M.*, 31, p. 528] in six days. Using the conidia of *Sclerotinia fructicola*, a spore germination dilution technique was adopted as standard assay. By successive extractions with ethyl acetate and chloroform 0·2 γ gliotoxin could be detected per gm. soil. *T. viride* was found to be capable of producing the antibiotic six days after the infestation of sterile soil, but it is apparently unable to form measurable quantities in a non-sterile medium. In pot experiments, however, damping-off (*Rhizoctonia* [*Corticium*] *solani*) of pea and radish was controlled to some extent in both sterile and non-sterile soil containing *T. viride* [ibid., 31, p. 238].

Gottlieb (D.), Siminoff (P.), & Martin (Mary M.). **The production and role of antibiotics in soil. IV. Actidione and clavacin.**—*Phytopathology*, 42, 9, pp. 493–496, 1952.

In further studies at the University of Illinois, Urbana, on the production and function of antibiotics in soil [cf. *R.A.M.*, 32, p. 141 and preceding abstract], neither actidione nor clavacin was removed from aqueous solution by soil. The antibiotics were not absorbed by illite or bentonite clays, nor did they cause them to flocculate; both inhibited the growth of *Bacillus subtilis* in soil.

Actidione was not produced by *Streptomyces griseus* either in a sterile unamended soil or with 0·5 per cent. oat or lucerne straw added. However, the addition of soybean meal resulted in the synthesis of the antibiotic in amounts varying with the concentration, the yields after 19 days from 0·5, 1, and 3 per cent. of the nutrient being 1·3, 4, and 10·1 μmg. per gm., respectively.

Actidione gradually lost some of its activity in a sterile black prairie loam soil, in which clavacin remained stable. In freshly dug non-sterile soil both antibiotics were decomposed.

Aspergillus clavatus proved to be antagonistic to *B. subtilis* in sterile soils artificially infested with both organisms. Clavacin could not be detected in soils infested with *A. clavatus* even after the addition of various carbon compounds; brown sugar was a partial exception, but its effect was merely transient, the 16 μgm. per gm. clavacin found on the third day having disappeared by the seventh. The presence of clavacin in the soil induced the rise of a resistant microflora, which in its entirety withstood 15 μgm. of the antibiotic per ml. in tests on rose bengal agar [ibid., 29, p. 433].

Smeby (R. R.), Leben (C.), Keitt (G. W.), & Strong (F. M.). **Production and purification of the antibiotic helixin.**—*Phytopathology*, 42, 9, pp. 506–511, 1 graph, 1952.

In further studies at the Departments of Biochemistry and Plant Pathology, University of Wisconsin, on the production and purification of helixin [*R.A.M.*, 31, p. 620], paper chromatograms of partly purified preparations disclosed four active components, designated helixins A, B, C, and D. The first three were obtained essentially free from one another by solvent fractionation. These results and those of agar streak tests led to the conclusion that helixin B and one of the components of endomycin [ibid., 30, p. 482] are similar and perhaps identical.

Darken (Marjorie A.). **Production of vitamin B_{12} by microorganisms and its occurrence in plant tissues.**—*Bot. Rev.*, 19, 2, pp. 99–130, 1953.

This is a general review of work on the chemistry, methods of assay, and commercial production of vitamin B_{12} and its occurrence in nature, which is apparently due to micro-organisms [*R.A.M.*, 24, p. 241], including actinomycetes and yeasts, and not to higher plants or animals. A bibliography of 215 titles is appended.

Balfour-Browne (Frances L.). **Three moulds from damp walls.**—*Trans. Brit. mycol. Soc.*, 35, 4, pp. 273–278, 2 figs., 1952.

Descriptions are given of *Rhinotrichum domesticum* n. sp., *R. lanosum*, and *Sepedonium albo-griseum* n. sp., isolated from damp paper and plaster of walls of a London house in November, 1941.

Krüger (E.). **Die Verhütung von Rauchschäden als pflanzenzüchterisches Problem.** [The prevention of smoke damage as a plant-breeding problem.]—*Freiberg. Forschungsh.* 2, 3 pp., 1951. [Abs. in *Ber. wiss. Biol.*, 81, 1–3, pp. 181–182, 1953.]

Efforts have been made by industrialists to mitigate the adverse effects of fumes, especially from sulphuric acid, on plant growth in Germany [*R.A.M.*, 31, p. 570, and below, p. 411], but the problem has received virtually no attention in agricultural circles. The author suggests the breeding of resistant species as a promising line of approach. Among the least sensitive of the conifers are black pine (*Pinus austriaca*) [*P. nigra*] and yew (*Taxus baccata*), while *Abies concolor* and *Picea pungens glauca* are also fairly resistant. Deciduous trees that may safely be grown in industrial areas include oak, *Sorbus aria*, poplar, and elder (*Sambucus nigra*). Vegetables with a measure of resistance to smoke injury are green cabbage, carrot, leek, celery, and horse-radish.

Müller (K. O.) & Black (W.). **Potato breeding for resistance to blight and virus diseases during the last hundred years.**—*Z. PflZücht.*, 31, 3, pp. 305–318, 1952.

The authors' survey of developments in the breeding of potatoes for resistance to blight (*Phytophthora infestans*) and virus diseases during the past century is based on 47 contributions to the literature, most of which have been noticed from time to time in this *Review*.

Thurston (H. D.) & Eide (C. J.). **The appearance and survival of new races of Phytophthora infestans.**—Abs. in *Phytopathology*, 42, 9, pp. 481–482, 1952.

In greenhouse tests isolates from blight (*Phytophthora infestans*) lesions detected on Cherokee potato leaves in two Minnesota fields in September, 1951, caused heavy infections on several clones deriving resistance to the pathogen from Müller's 'W' races of *Solanum demissum* [*R.A.M.*, 32, p. 207]. Previously, numerous local isolates had produced flecks or small spots on robust tissue and normal lesions only on senescent leaves of the same clones. When these clones were reinoculated with sporangia from each type of lesion there was no increase of pathogenicity, and similar adaptation experiments during the last three years have given negative results. Possibly, therefore, races like that observed on Cherokee may arise from occasional genetic changes and become abundant only on a selective variety. Cobbler plants were inoculated with a mixture of roughly equal numbers of sporangia of the Cherokee isolate and an ordinary one from the field. After three successive transfers to Cobbler, plants of both varieties were inoculated. Cobbler developed 20 times as many lesions as Cherokee, indicating lack of survival capacity of the Cherokee isolate in mixtures and perhaps explaining the failure to discover new races until the selective variety is available in considerable numbers.

Maklakova (Mme G. F.). К вопросу об устойчивости Картофеля к Фитофторе. [The problem of Potato resistance to *Phytophthora*.]—Докл. Акад. сельскохоз. Наук Ленина [*Rep. Lenin Acad. agric. Sci.* = *Proc. Lenin Acad. agric. Sci.*], 17, 9, pp. 24–28, 1952. [Received April, 1953.]

During studies from 1946 to 1950, inclusive, at the Pan-Soviet Scientific Research Institutes for Plant Cultivation and Plant Protection, field and laboratory trials were carried out to determine resistance of the potato to *Phytophthora infestans* [cf. preceding abstract]. Both the yield and degree of resistance were found to depend on the quality of the tubers used for planting. Tubers of even highly resistant varieties such as Kameraz No. 1 and 2, Krasnoufimsky, Uralsky, and hybrids of Veselovsky and Stahanovets when stored at temperatures of from 16° to 19° [C.] became susceptible, resulting in a reduced yield. Under optimum conditions for infection Kameraz No. 4 remained without infection either on the leaves or the tubers and Kameraz No. 3 suffered only slight (0–1) infection of the tubers when weakened by temperature treatment.

Large (E. C.). **Trials of substitutes for sulphuric acid for Potato haulm killing.**—*Plant Path.*, 1, 1, pp. 2–9, 2 pl., 1952.

Large (E. C.). **Trials of substitutes for sulphuric acid for Potato haulm killing. II. Blight in tubers.**—ibid., 1, 2, pp. 56–59, 11 graphs, 1952.

During 1951, co-operative trials were conducted at 11 centres in England and Wales to compare the effectiveness for the destruction of potato haulms [*R.A.M.*, 26, p. 561; 30, pp. 119, 285] of substitutes for sulphuric acid that could be used in ordinary spraying machines without acid-proof equipment. Each material was tested on a single one-acre plot at each centre, most of the spraying being carried out by contractors with the machines used for contract work. Assessments of the percentage kill of stems and leaves were made one, five, and 14 days after application. There was some variation from centre to centre in the performance of the materials, which was affected by the efficiency of the spraying machine used and the correctness of its setting, but on the whole 77 per cent. sulphuric acid (BOV) applied by a high-volume sprayer at 15 gals. in 85 gals. water per acre or by a low-volume sprayer undiluted at 20 gals. per acre gave better results than the substitutes; tar oil fraction TOF54, low volume at 25 gals. per acre, and sodium arsenite, high volume at 1 gal. in 99 gals. water per acre, came next, followed by

tar acid emulsion TAC49, high volume, at 10 gals. in 90 gals. water per acre, and sodium chlorate (99 per cent.), high volume, at 15 lb. in 100 gals. water per acre.

In preliminary trials of mechanical haulm destruction, which was slower than spraying, all four types of machine used effectively cut or pulverized most of the haulm. In the prevailing moist, dull conditions the debris dried very slowly and where blight [*Phytophthora infestans*] was present the fungus generally continued to spore actively on cut leaves and stems in the furrows for at least a fortnight.

The mean percentage of blighted tubers, assessed at lifting and again after six weeks' storage, was about the same following chemical and mechanical haulm destruction and no less than that in control plots where the haulm was left to be killed by blight itself. The work is being continued.

HANSEN (F.). **Undersøgelser over opbevaring af Kartofler.** [Investigations on the storage of Potatoes.]—*Tidsskr. Planteavl.*, 56, 2, pp. 222–245, 1953. [English summary.]

A fully tabulated account is given of investigations on potato storage at the State Experiment Station, Blangstedsgaard, Denmark, covering the periods 1939–45, 1947–8, and 1948–51. King Edward, Bintje, and Deodara tubers were kept either in cold storage boxes at various temperatures or in glass containers with different carbon dioxide levels in the atmosphere.

Wounded tubers, including those with deep scab [*Actinomyces scabies*] injuries, sustained heavy damage from [unspecified] rots, which increased as the temperature fell below 5° C. and the carbon dioxide content rose above 1 to 2 per cent. The diseased tubers germinated poorly and a large number of the resultant plants developed black leg [*Erwinia phytophthora*] in the field. The losses were reduced by maintaining a temperature of 15° during the first fortnight of storage.

RANKIN (H. W.). **Progress report on internal cork of Sweetpotatoes.**—Abs. in *Phytopathology*, 42, 5, p. 287, 1952.

In further experiments [in Georgia] in 1950, 164 sweet potato varieties and selections were tested for resistance to internal cork virus [*R.A.M.*, 32, p. 276 and next abstract], using grafting and aphid methods of transmission. The 22 selections reaching the requisite standard were re-tested in 1951, when most of them again proved highly resistant and a few were apparently immune. These lines are available for breeding work. Octa-methylpyrophosphoramide was the best of the sprays tested for the control of insect vectors of the virus [*Myzus persicae*: ibid., 30, p. 244].

KUSHMAN (L. J.) & DEONIER (M. T.). **Effect of curing and storage temperatures on development of internal cork in Sweet Potato roots.**—*Proc. Amer. Soc. hort. Sci.*, 60, pp. 359–362, 1952. [Received April, 1953.]

In further experiments at Meridian, Mississippi, on the storage of sweet potatoes carrying internal cork virus [*R.A.M.*, 32, p. 33 and preceding abstract] Porto Rico roots were dug on 19th October, 1950, and either placed directly in storage or cured for ten days at 85° F. or 95° and then stored at three different temperatures and at 80 per cent. relative humidity or higher. On 9th May, 1951, the percentages of internal cork at 50°, 60°, and 70° storage temperature were 17, 29, and 72, respectively, the results of the three curing conditions having been averaged. Curing at 85° or 95° for ten days did not affect the subsequent development of internal cork. The highest temperature not only increased the severity of the symptoms but also the number of roots affected [ibid., 30, p. 487].

Hilton (R. N.). **Bird's eye spot leaf disease of the Hevea Rubber tree caused by Helminthosporium heveae Petch.**—*J. Rubb. Res. Inst. Malaya*, 14, *Commun.* 280, pp. 42–92, 10 pl., 1952.

An investigation was carried out from September, 1948, to August, 1950, at the Rubber Research Institute Experiment Station, Sungei Buloh, Selangor, Malaya, into bird's eye leaf spot of *Hevea* rubber (*Helminthosporium heveae*) [C.M.I. map No. 270]. A full account of the available information to date is given. On leaves less than two weeks old small spots, at first yellow, later dark and water-soaked, and about 0·2 mm. in diameter, appear. In 24 hours the initial yellow spot is surrounded by a narrow black margin, delimiting an area 1 to 3 mm. in diameter. After two days this area becomes straw-coloured and two days later white. At this stage sporing begins, but is sparse. About three weeks after infection the characteristic 'bird's eye spot' symptoms develop. The white centre now consists only of the upper and lower cuticles with fragments of hyphae in between. The margin is raised and red-brown, and the whole is surrounded by a yellow halo. On the lower surface a few conidiophores and 20 to 30 spores may be present. Usually a number of infections may start on one lamina and coalesce; the infected area then rapidly becomes covered with dark mycelium and masses of spores. This 'rampant' form of infection causes defoliation, and in severe cases repeated defoliation results in the swollen 'sausage top' condition of the upper stem.

The lesions on leaves infected when over three weeks old are dark brown, discrete, and surrounded by a heavy tannin deposit round which is a narrow yellow halo. Sporing is slight or absent.

Every affected leaf presents a combination of two or three symptom types. During most of the season sporing is relatively slight, but continuous. It usually becomes heavy a few weeks after initial infection, but in special circumstances (probably related to weather conditions) heavy sporulation may occur at other times. When sporing is rapid secondary spots follow the primary ones on the same leaf. At the stage of rapid elongation the young stem is susceptible, but only localized, non-sporing, dark, elongated lesions appear. Any assessment of disease should be made on mature leaves only, and before secondary fungi intervene.

The spores germinated in two hours and penetrated the plant within six. They were highly resistant to heat (temperatures up to 80° C. having no adverse effect on them, 99·5 per cent. germination occurring on one occasion after exposure to 135°), poisons, and prolonged storage. Germinating spores and mycelium both tolerated a wide pH range.

Dissemination is by wind, and once a nursery has become infected subsequent spread is very rapid, hardly a single leaf remaining unaffected. Degree of shading and age of leaf are important factors governing host-parasite relations; heavy shade or maturity of the leaf may prevent infection. Spread of the fungus and infection are not influenced by wet or dry weather. Wet conditions, however, appear to reduce attacks by favouring plant growth.

No resistant seedlings of *Hevea brasiliensis* were found; *H. benthamiana* is resistant, though not immune.

A study of environmental conditions showed that an epidemic outbreak may be expected after a period of dry weather on a poor soil with a large area of closely planted seedlings subjected to disturbance by wind or labourers. No economical method of fungicidal treatment has yet been found.

Smith (G.). **Aspergillus brevipes n. sp.**—*Trans. Brit. mycol. Soc.*, 35, 4, pp. 241–242, 1 pl., 1952.

A description is given of *Aspergillus brevipes* n. sp., isolated from Australian alpine soil and characterized by the production of an intensely pigmented mycelium

(vinaceous pink on malt and potato agars, developing yellow-green conidial areas) and frequently sessile conidial heads.

WARCUP (J. H.). **Effect of partial sterilization by steam or formalin on damping-off of Sitka Spruce.**—*Trans. Brit. mycol. Soc.*, 35, 4, pp. 248–262, 1 pl., 1 diag., 1952.

Seedlings of Sitka spruce [*Picea sitchensis*] and other conifers have shown very poor growth in many old-established forest nurseries in Great Britain during recent years. In 1950 a few Sitka spruce seedlings in soil plots at the Old Ampthill Nursery, Bedfordshire, showed typical damping-off symptoms 3 to 7 weeks after germination, while many died gradually, shrivelling and turning brown while still upright. By mid-July 70 to 80 per cent. had died and those remaining were stunted, with partly or entirely diseased root systems. The roots of seedlings in sterilized soil [*R.A.M.*, 30, p. 591; 32, p. 108] were clean and white.

The fungi most commonly isolated from living seedlings in untreated plots were *Pythium ultimum*, *Pythium* E 39, *Pythium* E 16, and two strains of *Fusarium oxysporum*. Laboratory tests in which steam-sterilized Kettering loam was inoculated and sown with Sitka spruce seeds demonstrated the pathogenicity of the three *Pythium* species [ibid., 32, p. 111], the other isolates being apparently of little importance. *P. ultimum* was generally the most virulent; at low soil moisture it caused a root rot which killed the seedlings gradually, leaving them upright. At high soil moisture it produced typical damping-off and rapid rotting. In sterilized Ampthill soil kept at 70 per cent. water-holding capacity it caused pre-emergence losses ranging from 70 to 100 per cent. and killed seedlings within 10 to 14 days of emergence. The symptoms caused by *Pythium* E 16 also varied with the soil moisture. *Pythium* E 39 caused heavier post- than pre-emergence losses irrespective of soil moisture, and generally attacked the seedlings at a later stage than the other two fungi, causing root rot. Damping-off losses, particularly after emergence, were 42 to 95 per cent. in naturally contaminated Ampthill nursery soil even at comparatively low soil moisture contents (35 to 40 per cent. water-holding capacity). *P. ultimum* was abundant in the soil of three alkaline nurseries (pH 6·8 to 7·2) but rare or absent in two with acid soil (pH 5·3 to 5·5).

The *Pythium* spp. did not survive either steam or formalin treatment at Ampthill and subsequent recolonization of treated soil was slow. Formalin was highly toxic both in culture and in soil. Although both treatments increased the numbers and height of Sitka spruce seedlings in the first year and showed a moderate residual effect during the second, little effect was observed during the third year after treatment.

ASKEW (H. O.). **Boron deficiency in the Nelson district.**—Abs. in *Rep. Sci. Congr. roy. Soc. N.Z., 1951*, p. 233, 1952.

It is stated that in the paper read before the Seventh Science Congress held at Christchurch, New Zealand, 15th to 21st May, 1951, the author described the symptoms and methods of controlling boron deficiency in apples [*R.A.M.*, 26, p. 158], raspberries [ibid., 31, p. 70], grapes [ibid., 24, p. 89], tobacco [ibid., 26, p. 359], hops, and turnips [ibid., 20, p. 616] in the Nelson area, New Zealand.

SANFORD (H.). **Pepper in Sarawak.**—*Malay. agric. J.*, 35, 4, pp. 208–214, 3 col. pl., 1952.

In this digest of a booklet on pepper (*Piper nigrum*) in Sarawak, which includes a section on pests and diseases, it is stated that an unidentified fungus, probably *Fomes lignosus* [*R.A.M.*, 13, p. 216], sometimes occurs on stems of pepper vines. Infection is believed to come from old supports that have been left in old, aban-

doned pepper gardens. Included in the list of diseases is the white thread disease due to a *Cyphella* sp.

PORTER (C. L.) & HIMELICK (E.). **Production of disease-free stock of Mentha piperita L.**—Abs. in *Phytopathology*, 42, 9, p. 472, 1952.

Clean planting stock (rooted rhizomes) of peppermint (*Mentha piperita*) would contribute materially to the control of wilt (*Verticillium albo-atrum*) in Michigan and Indiana [*R.A.M.*, 31, p. 576]. When rhizomes selected in the spring and autumn were subjected to temperatures lethal to the fungus, the highest percentage of viable, healthy material was secured by an exposure of 55 minutes at 47° C. or 35 at 48°. In these experiments no trace of infection was observed in rhizomes inoculated with the fungus five days before the effective treatments. The results of laboratory and greenhouse investigations indicate that disease-free propagating stock can be produced by this method.

KEYWORTH (W. G.). **Resistance of Hop stems to invasion by Verticillium albo-atrum.**—*Nature, Lond.*, 171, 4354, pp. 656–657, 1953.

An attempt was made at East Malling Research Station, Kent, to differentiate between stem and root reaction to *Verticillium albo-atrum* in hops [*R.A.M.*, 32, p. 277] and to study the reactions, under uniform conditions, of the stems of varieties differing in resistance. The latter project was accomplished by infection through the rootstocks of another variety or by direct stem inoculation of one variety with strains of the fungus to which it shows a differential response when root-inoculated.

Reciprocal rootstock-stem grafts were made between the varieties OR 55 and Fuggle and the soil was infested with a virulent strain of *V. albo-atrum*, the controls being grown on their own (grafted) roots. When infected through Fuggle roots the stems of both varieties became heavily invaded and died, but when infected through OR 55 roots both developed only mild symptoms. Fuggle stems growing on their own (healthy) roots were directly inoculated with the mild and virulent strains [ibid., 28, p. 308]. When a small drop of spore suspension was introduced into the stem xylem both strains grew in an attenuated fashion above the point of inoculation, but when a large amount of spore suspension of either race was introduced into the pith cavity, both caused severe wilt accompanied by extensive xylem invasion. The roots of all plants remained uninvaded. It appears, therefore, that the reaction of Fuggle stems was not determined by the race of the fungus but by the conditions of invasion and the stems themselves did not function purely as inert growth media for the pathogens. In tests on Fuggle roots the amount of inoculum did not affect the severity of wilt or the growth of the fungus in the plant. Roots, therefore, differed fundamentally from stems in that their resistance was related to fungal virulence and not to the inoculum dose.

It is concluded that the site of differential resistance lies in the roots, the stems of varieties of both high and low resistance being equally resistant to both strains of the pathogen. This resistance is high under conditions of mild root invasion, but in a variety of low resistance the host-parasite association in the roots causes stem resistance to be reduced or overcome. Possible reasons for this are (a) a reduction of stem resistance by diffusion of toxins from the invaded roots or by the impairment of the normal root function, or (b) an increase in the invasive power of the fungus by the establishment of a suitable 'inoculum potential', or by the diffusion of fungal accelerators.

The above conclusions may be widely applicable to vascular wilts and, if so, may necessitate a reorientation of previous views on the mechanism of parasitism by vascular pathogens and suggest a new approach to the study of host resistance.

Sharma (S. L.). **Pathogenicity of Puccinia kuehnii (Krueg.) Butler on Sugarcane in Bihar.**—*Curr. Sci.*, 21, 10, p. 288, 1952.

In inoculation tests at the Central Sugar-Cane Research Station, Pusa, India, the sugar-cane varieties Co. 453, Co. 475, Co. 513, B.O. 10, and B.O. 11 were immune from *Puccinia kuehnii* [*R.A.M.*, 30, p. 1], which is prevalent on *Erianthus arundinaceus* at Pusa.

Luke (H. H.). **Fungi isolated from Sugarcane soils of Louisiana and their antagonistic effect on Pythium arrhenomanes.**—Abs. in *Phytopathology*, 42, 9, p. 469, 1952.

The four major types of sugar-cane soil in Louisiana were sampled at quarterly intervals for one year and the fungal populations, pH values, and moisture percentages determined. A total of 5,218 fungal isolates from the samples were tested for antagonism to *Pythium arrhenomanes* [cf. above, p. 372], which causes sugar-cane root rot. Some 17 per cent. inhibited the growth of the pathogen in agar cultures, antibiotic values being higher in the heavy clay soils (where, however, the disease is prevalent) than in light sandy ones.

Briceño (G. C.). **Más variedades de Caña de Azúcar.** [More varieties of Sugar-Cane.]—*Agricultor venezol.*, 17, 157, pp. 26–27, 2 figs., 1952. [Received 1953.]

The sugar-cane improvement programme in Venezuela conducted at the various experiment stations attached to the Sugar-Cane Division, National Institute of Agriculture, is aimed at replacing local varieties with others, imported chiefly from abroad, which are adapted to local conditions and resistant to mosaic [*R.A.M.* 29, p. 479; 30, pp. 246, 310; 31, p. 459; 32, p. 212]. Imported seed is screened at two quarantine houses to prevent the introduction of other diseases.

Toro (R. A.). **A study of the tropical American black-mildews.**—*J. Agric. Univ. P.R.*, 36, 1, pp. 24–87, 5 figs., 1 map, 1952. [Received March, 1953.]

In this detailed study, carried out in the Department of Botany, Howard University, Washington, D.C., the author correlates all the available data concerning the genera in tropical America originally assigned to the Perisporiaceae [*R.A.M.*, 29, p. 479] and attempts to clarify their systematic position. The limits and characters of the genera treated are those of their respective authors and the interpretation of their systematic position follows that of Miller [ibid., 28, p. 547]. The majority are now embodied in 24 genera in the new family Parodiopsidaceae, which includes eight new combinations and one new name. The family is composed of two tribes: the Parodiopsideae are directly parasitic on the leaves, producing abundant, external, coloured mycelium with stomopodia and internal mycelium and having a conidial stage unlike that of *Oidium*; the Dimerinae are epiphytes, not penetrating the leaf tissue. The remainder are included in the Meliolaceae [ibid., 31, p. 258]. *Meliola trichostroma* is suggested as the lectotype of *Meliola*.

Imazeki (R.). **A contribution to the fungous flora of Dutch New Guinea.**—*Bull. For. Exp. Sta. Meguro* 57, pp. 87–140, 12 pl., 10 figs., 1 map, 1952. [Japanese summary].

Notes are given on 71 basidiomycetes, 65 of them Polyporaceae, collected in the north-western part of Dutch New Guinea [cf. *R.A.M.*, 5, pp. 37, 54] during 1943, and their distribution in other parts of the world. Ten species are new to eastern Asia and 43 new to the flora of New Guinea. One new genus (*Trachyderma* [ibid., 18, p. 712] is raised to generic rank) and 28 new combinations and six new species are described [all without host or substratum].

Sawada (K.). **Researches on fungi in the Tôhoku District of Japan (III). Uredinales.**—*Bull. For. Exp. Sta. Meguro* 57, pp. 7–85, 1952. [Japanese and English.]

A further study in this series comprises a systematic, annotated list of 283 Uredinales belonging to 28 genera occurring in Tôhoku, Japan [cf. *R.A.M.*, 31, p. 577].

Ahmed (Q. A.). **Fungi of East Bengal.**—*Pakistan J. For.*, 2, 2, pp. 91–115, 1952.

This comprehensive list of fungi and viruses in East Bengal [cf. *R.A.M.*, 18, p. 57; 32, pp. 102, 340], the first of its kind to cover the whole of this area, includes descriptions of 269 species distributed over 117 genera.

Wehmeyer (L. E.). **The collection and preservation of ascomycetous fungi.**—*Asa Gray Bull.*, N.S., 1, 4, pp. 315–323, 1952. [Received April, 1953.]

Brief notes are given on the habitats, macroscopic characters, and methods of collecting and preserving ascomycetes found on herbaceous stems and leaves, tropical sooty moulds, temperate and arctic pyrenomycetes, leaf spot fungi, and species occurring in special ecological habitats, on woody substrata, and on dung.

Corner (E. J. H.). **Generic names in Clavariaceae.**—*Trans. Brit. mycol. Soc.*, 35, 4, pp. 285–298, 1952.

In this paper, elucidating problems concerning the nomenclature of the Clavariaceae which have arisen since the publication of the author's monograph [*R.A.M.*, 30, p. 124], three species are proposed as lectotypes and two generic names are reduced to synonymy. Detailed arguments are provided with reference to original material of the type species and to extensive monographic revision.

Gutsevich (S. A.). Обзор ржавчинных грибов Крыма. [Survey of the rust fungi of Crimea.]—172 pp., 140 figs., Leningrad, Zhdanov Leningrad State University, 1952. 8 roubles, 20 copecks.

This survey of the rust fungi of Crimea, totalling 229 species (207 belonging to Pucciniaceae and 22 to Melampsoraceae) on 369 plant species from 46 families, is an important contribution to the study of rusts in the U.S.S.R. [*R.A.M.*, 19, p. 167]. An alphabetical list of new host records includes 25 new to Crimea, and 11 to Russia. *Uromyces brominus* n. sp. on *Bromus riparius* and *B. benekini* is described. There are indexes of the host plants, given in Latin and Russian, with the Russian equivalents of Latin family names and an alphabetical list of all the rust fungi recorded.

Safeeulla (K. M.) & Govindu (H. C.) **Notes on two Synchytrium species.**—*Curr. Sci.*, 21, 11, pp. 319–320, 1 fig., 1952.

Synchytrium millingtonicolum n. sp. is the name proposed for a fungus responsible for gall formation on the leaves of *Millingtonia hortensis* near Bangalore, India.

The authors consider that *S. phaseoli-radiata*, recently reported on *Phaseolus radiatus* and *P. mungo* [*R.A.M.*, 32, p. 38], is identical with *S. ajrekari*, previously reported on *P. mungo* [ibid., 31, p. 99], and should be treated as its synonym.

Bisby (G. R.) & Hughes (S. J.). **Summary of the British Hysteriales.**—*Trans. Brit. mycol. Soc.*, 35, 4, pp. 308–314, 3 figs., 1952.

The genera and species of *Farlowiella*, *Gloniopsis*, *Hysterium*, *Hysterographium*, and *Mytilidion* are summarized and a revised key to British species is appended [cf. *R.A.M.*, 32, p. 102].

Loeters (J. W.) & Stam (J. C.). **Het steriliseren van zaadbedden voor Tabak volgens een vereenvoudigde methode.** [The sterilization of Tobacco seed-beds by a simplified method.]—*Meded. Dir. Tuinb.*, 15, 9, pp. 811–815, 4 figs., 1952. [English summary.]

A simplified method for the steam sterilization of tobacco seed-beds, described in publications from the tobacco research stations at Bergerac, France, and Prilep, Yugoslavia, was tested during the winter of 1951–2 in three localities in Holland. A layer of wet soil 10 cm. deep is placed on an iron sheet over a fire in a trench 40 to 50 cm. in depth and 50 to 60 cm. in width and constantly stirred for 15 to 20 minutes. Not only were seed germination and seedling growth much better in treated than in untreated soil, but the tobacco mosaic and rattle [potato stem mottle] viruses [*R.A.M.*, 32, p. 145] and *Thielaviopsis basicola* [ibid., 28, p. 424] were effectively combated by steaming.

Bradley (R. H. E.). **Infectivity of aphids after several hours on Tobacco infected with Potato virus Y.**—*Nature, Lond.*, 171, 4356, pp. 755–756, 1953.

At the Field Crop Insect Laboratory, Canada Department of Agriculture, Fredericton, New Brunswick, *Myzus persicae* were fed singly on tobacco leaves infected with potato virus Y [*R.A.M.*, 31, p. 293]. Continuous feeding for more than an hour was indicated by the excretion of three or four drops of honeydew, detected on a filter paper previously soaked in a solution of bromo-cresol green placed below, visible blue spots forming thereon wherever drops of honeydew fell. Aphids which had thus excreted for about an hour were transferred to healthy White Burley tobacco plants for several hours. Of 25 aphids tested not one transmitted the virus, but fasted aphids that spent five minutes on the same infected plants were more than 60 per cent. infective.

After spending several hours on a plant nearly all the aphids that appeared to be feeding had their stylets inserted more than 25 μ. Disturbing the aphids did not appear to affect their ability to transmit; those disturbed a second time about a minute after the stylets were re-inserted were more than 30 per cent. infective. After several hours on infected tobacco the virus was only transmitted by aphids beginning to insert the stylets or by those that had made a brief feeding puncture. During punctures lasting about a minute the stylets were inserted only into the epidermal cells [cf. ibid., 32, p. 10], but nevertheless the virus was acquired. Aphids were rarely, if ever, infective when the stylets had penetrated as far as the mesophyll or phloem.

Wilkinson (J.). **Virus-induced nucleolar abnormalities in Tomato.**—*Nature, Lond.*, 171, 4354, pp. 658–659, 1 fig., 1953.

The recent examination of somatic divisions in tomato and tobacco plants affected by the aspermy virus [*R.A.M.*, 31, p. 635] in the Department of Botany, University College of the South West, Exeter, revealed the occurrence of widespread nucleolar and other abnormalities, some of which resembled the aberrations regarded as typical of the cell divisions found in malignant animal tissue. There appears to be some competition between the virus particles and chromonematal material for nucleoprotein contained in the nucleolus.

Justham (Moira C. D.) & Ogilvie (L.). **Tomato mosaic in relation to source of seed.**—*Plant Path.*, 1, 2, pp. 64–65, 1952.

In a trial, carried out at a commercial nursery in Gloucestershire in 1948, the incidence of mosaic in tomatoes raised from eight samples of seed taken from virus-free plants was compared with one sample from plants infected with [tobacco] mosaic virus [*R.A.M.*, 23, p. 120; 31, pp. 223, 520]. All sets of seedlings became

infected though strict precautions were taken to prevent infection. The distribution of the first plants to show symptoms bore no relation to the source of seed.

Alexander (L. J.). **Effect of the Tobacco mosaic disease on the yield of unstaked Tomatoes.**—Abs. in *Phytopathology*, **42**, 9, p. 463, 1952.

In 1950 unstaked plants of Rutgers, Stokesdale, and a breeding line of tomato (numbered 80½) were inoculated [at the Ohio Agricultural Experiment Station] with a yellow strain of tobacco mosaic virus [cf. *R.A.M.*, 30, p. 249], some on 5th June and others on 17th July, while the remainder were allowed to contract natural infection on or after 16th August, when harvesting began [loc. cit.]. In 1951 a green strain [ibid., 30, pp. 632, 633] was used on approximately the same dates. In 1950 the yields [cf. ibid., 32, p. 39] of late-infected plants of Stokesdale, Rutgers, and 80½ were 21·83, 15·39, and 19·69 tons per acre, respectively, and the reductions for 5th June inoculation 50, 52, and 31 per cent., respectively. The corresponding figures for 1951 were 24·87, 18·83, and 26·66 tons per acre, and reductions of 30, 15, and 19 per cent.

Holmes (F. O.). **Inheritance of resistance to Tobacco mosaic disease in Tomato.**—Abs. in *Phytopathology*, **42**, 9, p. 467, 1952.

In earlier work [at the New Jersey Agricultural Experiment Station] the mode of inheritance of a tendency in the progeny of crosses between tomato and *Lycopersicum chiloense* to escape infection by tobacco mosaic virus [see preceding abstract] could not be explored owing to the high degree of sterility in the hybrid lines. More recently, however, fruitful lines of tomato resistant to the disease were found to show a similar trend. In a series of backcross tests the aptitude for evading infection appeared to depend on a single dominant gene.

Sukhov (K. S.), Vovk (A. M.), & Mushnikova (Mme K. S.). Производственное испытание дуста ДДТ в борьбе со столбуром Томата. [Investigations on a commercial scale on DDT powder for the control of Tomato stolbur.]—Докл. Акад. сельскохоз. Наук Ленина [*Rep. Lenin Acad. agric. Sci* = *Proc. Lenin Acad. agric. Sci.*], 17, 8, pp. 24–27, 1952. [Received April, 1953.]

In trials at the Moscow Station for Plant Protection, U.S.S.R., for the control of tomato stolbur [tomato big bud virus: *R.A.M.*, 27, p. 48; 32, p. 236], which is very widespread and destructive in the south, DDT (40 kg. per ha.) was very effective against the only insect vector (*Hyalesthes*) known so far, which transmits the disease from infected weeds. The best control was obtained on the Earlyana variety with 10·7 per cent. infection as against 62·3 per cent. for the undusted. Control of perennial susceptible weeds and the cultivation of resistant varieties are strongly recommended.

Gallegly (M. E.). **Physiologic races of the Tomato late blight fungus.**—*Phytopathology*, **42**, 8, pp. 461–462, 1952.

In 1951, in pursuance of a search initiated the previous year for resistance to tomato blight (*Phytophthora infestans*) [*R.A.M.*, 31, p. 636] in West Virginia, field plantings were expanded to include 662 accessions, mostly obtained from the Plant Introduction Stations in Iowa and Maryland. Disease index readings ranged from slight to severe [cf. above, p. 395]. As in 1950, West Virginia No. 36 (Cherry tomato from North Carolina) remained healthy for a fortnight longer than most of the other accessions. In a preliminary inoculation test on six-week-old plants under controlled conditions, Nos. 36 and 106 (PI 108245) were resistant to three of the several isolates used, viz., M-6 from Pennsylvania, M-7 from Indiana, and WV-6T from West Virginia, though an occasional plant of the former was susceptible, indicating that the selection was not homozygous for resistance. In another

experiment 10 to 15 three-week-old plants of 11 accessions growing in pots of vermiculite were inoculated with each of five isolates. All were susceptible to M-13 from Florida and WV-2T from West Virginia. Nos. 19 (Ornamental Tomato, P_1), 41 (Phyllis), 731 (25-1 PA St W, all from Florida), and 36 were resistant to M-7 and WV-6T, while only No. 36 was resistant to M-6 from Pennsylvania.

The existence of at least three physiologic races of *P. infestans* [loc. cit.] is inferred from these data, one comprising isolates M-7 and WV-6T, a second M-6, and a third M-13 and WV-2T. Nos. 36 and 106 were resistant to all the available isolates except M-13 and WV-2T. It is further apparent that some wild types of tomato carry resistance to *P. infestans*, which has not been found among commercial varieties.

Henning (R. G.) & Alexander (L. J.). **Evidence of existence of physiologic races of Alternaria solani (Ell. & Mart.) Jones & Grout.**—Abs. in *Phytopathology*, 42, 9, p. 467, 1952.

Of 180 monoconidial isolates of *Alternaria solani* obtained from tomato leaves in Ohio, ten were selected on the basis of cultural differences for pathogenicity tests. Fragmented mycelial suspensions were sprayed on six-week-old seedlings of tomato, *Lycopersicum pimpinellifolium*, *L. hirsutum* var. *glabratum*, *L. peruvianum* and its var. *humifusum*, and *L. glandulosum*, which were then placed first in a humidity chamber for 48 hours and afterwards on greenhouse benches for eight days. The degree of infection was then determined by the average numbers of lesions per inoculated leaflet, which ranged from none to five or more. There were three types of lesion, all yielding the fungus, namely, (1) small, restricted, and necrotic; (2) larger, spreading, and watersoaked; and (3) intermediate, resembling (1) but diffusing into the leaf veins. These observations are regarded as constituting evidence of physiologic specialization within *A. solani*.

Matsui (C.). **Relation of temperature to the activity of solanacearum phage a.**—*Ann. phytopath. Soc. Japan*, 16, p. 34, 1952. [Japanese.]

The phage a isolated from the root of a wilted tomato plant is more specific than that isolated by Matsumoto and Okabe [*R.A.M.*, 17, p. 17], being effective exclusively against a strain of *Bacterium* [*Pseudomonas*] *solanacearum* isolated from the stem of a wilted tomato plant. The thermal inactivation point, determined by the plaque method, is 50° C. for 10 minutes, i.e., the same as that of the pathogen, but lower than that of the phage reported by Matsumoto and Okabe.

McLaughlin (W. D.) & True (R. P.). **The effects of temperature and humidity on the longevity of conidia of Chalara quercina.**—Abs. in *Phytopathology*, 42, 9, p. 470, 1952.

Chips of oak twigs known to harbour *Chalara quercina* [*Endoconidiophora fagacearum: R.A.M.*, 32, p. 348 and following abstracts] and glass beads dipped in a suspension of the fungus were placed in desiccators maintained at relative humidities of about 93, 81, 55, and 20 per cent. and at temperatures of 30°, 25°, 20°, and 10° C. for each humidity level. Conidia survived longer on beads than in the twigs. At 30° they lived less than 16 days at all humidities and at 25° under a month except at the 20 per cent. level, whereas at 20° they were still viable in some samples after 111 and at 10° after 173 days.

True (R. P.), Staley (J. M.), Leach (J. G.), Barnett (H. L.), & Dorsey (C. K.). **Liberation of spores from natural reservoirs facilitates overland spread of Oak wilt.**—Abs. in *Phytopathology*, 42, 9, p. 476, 1952.

The death of oak trees infected by *Chalara quercina* [*Endoconidiophora fagacearum* in the United States: see preceding and next abstracts] is accompanied by

the growth of the fungus into the bark. Mycelial mats are formed in small shrinkage cavities in the cambial and cork cambial regions. Cushions with daedalioid contact surfaces, partially composed of pseudoparenchyma, develop in the cambium; as they grow they thrust the bark from the wood and rupture it. Within the cavity produced the fungus sporulates abundantly, emitting a characteristic odour that appears to attract insects, including nitidulids and scolytids. Insects transferred from mycelial mats of B compatibility to those of A induced perithecial formation within three days, indicating their capacity for spermatization and the transmission of infection. Endoconidia are produced during all stages of mat development, but perithecia have been found only on mats below ruptured bark. Both endoconidia and ascospores may be carried overland from these open reservoirs of inoculum by the above-mentioned insects, so that control measures, to be effective against this mode of spread, must be instituted before the bark is ruptured.

Bazzigher (G.) & Fischer (F.). **Über die Eichenwelkekrankheit in den U.S.A.** [On the Oak wilt disease in the U.S.A.]—*Schweiz. Z. Forstw.*, 103, 6–7, pp. 234–238, 1952.

Essential information is summarized on the severity, distribution, symptomatology, host range, etiology, and control of oak wilt (*Chalara quercina*) [*Endoconidiophora fagacearum*] in the United States [see preceding abstracts]. The most effective method for its exclusion from Europe would be an absolute ban on the introduction of foreign oak seedlings, supplemented at discretion by the disinfection of imported logs and sawn timber.

Uemura (S.). **Studies on the root nodules of Alders (Alnus spp.). (V) Some new isolation methods of Streptomyces from Alder nodules.**—*Bull. For. Exp. Sta. Meguro* 57, pp. 209–226, 2 pl., 1952. [Japanese, with English summary.]

At the Laboratory of Forest Soil Microbiology, Government Forest Experiment Station, Meguro, Japan, *Streptomyces* colonies of three types (representing 12 per cent. of the isolates) were obtained by plating the stelar tissue of aseptically excised nodules from the roots of *Alnus tinctoria* var. *glabra*, *A. japonica*, *A. sieboldiana*, and *A. firma* [cf. *R.A.M.*, 24, p. 333] on yeast-glucose-peptone agar and incubating for about a month at 28° C. Another method was to crush sterilized, fresh, complete nodules from one- to two-year-old alder seedlings in the same medium, yeast-mannite, or beef extract-peptone agar.

From nodules on the roots of *Myrica rubra*, *Elaeagnus umbellata* [cf. ibid., 31, p. 36], and *Casuarina equisetifolia*, *Streptomyces* strains peculiar to each tree species were isolated, especially by the first method.

Itô (K.) & Hosaka (Y.). **Notes on some leaf-spot diseases of broadleaved trees. II. Septoria leaf-spot of Zelkova serrata Makino.**—*Bull. For. Exp. Sta. Meguro* 57, pp. 163–182, 4 pl., 5 figs., 1952. [Japanese summary.]

A study was made of the etiology and pathology of *Septoria abeliceae*, causing brown leaf spot of *Zelkova serrata* [*R.A.M.*, 10, p. 491], and probably present in Japan wherever the host is grown, incurring considerable losses of seedlings. The fungus commonly overwinters as immature pycnidia in the tissues of fallen leaves. The latter also yielded perithecia of the genus *Mycosphaerella* but the relation between this and the *Septoria* stage is not yet clear. The mycelium grew well on the following agar media: Saito's soy, Czapek's solution with dry yeast, potato sucrose, and Waksman's solution; the optimum, maximum, and minimum temperatures were 22° to 25° C., 30°, and 5°, respectively. Conidia were produced abundantly in Czapek's and Waksman's solutions at 22° to 25°. The germination

percentage for the overwintered pycnidiospores was generally about 40. The optimum, maximum, and minimum temperatures for germination of fresh pycnidiospores were 28°, 35°, and 8°, respectively, and they needed a saturated atmosphere.

Pathogenicity was established in inoculation experiments. The incubation period for the fungus in the host varied considerably with the age of the leaves and environmental conditions.

Srinivasan (K. V.). **Seedling blight of Sesbania grandiflora Pers.**—*Curr. Sci.*, 21, 11, p. 318, 1952.

The death of about 90 per cent. of a seedling stand of *Sesbania grandiflora* at Bapatla, India, followed the August rains in 1950. Elongated or oblong cankers (6 to 10 mm. long) were present at the collar region, with black, erumpent acervuli (80 to 205 μ in diameter) with a well-developed stroma. A *Colletotrichum* sp. resembling *C. capsici* [*R.A.M.*, 32, p. 177] was isolated. The symptoms were reproduced when healthy seeds of *S. grandiflora* were steeped in a spore suspension of the fungus or when it was sprayed on to the cotyledons. On chilli (*Capsicum annuum*) fruits it caused only small, watersoaked or brown circular lesions with few acervuli when first isolated, but after being maintained on chilli fruits it then caused the rapid rot typical of *Colletotrichum capsici*. Similarly, an isolate of *C. capsici* at first failed to infect *S. grandiflora* seedlings but after maintenance on sterilized stems of this host it produced typical seedling blight [cf. ibid., 26, p. 544]. The *Sesbania* fungus is considered to be identical with *C. capsici*.

Rhoads (A. S.). **The destructiveness of Clitocybe root rot to plantings of Casuarinas in Florida.**—*Lloydia*, 15, 3, pp. 161–184, 4 figs., 2 diags., 1952.

Casuarina spp. grown in Florida in ornamental, roadside, and wind-break plantings are widely attacked by mushroom root rot (*Clitocybe tabescens*) [cf. *R.A.M.*, 20, p. 563; 27, p. 279, *et passim*], which is often highly destructive. *Casuarina cunninghamiana* appears to be less susceptible than the other five species planted. Trunks of *C. lepidophloia* girdled by the fungus develop a conspicuous hypertrophy above the girdled part; a similar tendency has been observed on *C. stricta*.

While the principal manner of transmission appears to be by root contact, the frequent occurrence of the disease in young *Casuarina* plantings on land planted with citrus for periods from 20 to 50 years suggests that infection may also occur in some other way. Incidence is highest on well-drained, light sandy, dominantly acid soils subject to drought, which before clearing supported oak and other hardwood trees.

Doran (W. L.). **Effects of treating cuttings of woody plants with both a root-inducing substance and a fungicide.**—*Proc. Amer. Soc. hort. Sci.*, 60, pp. 487–491, 1952. [Received April, 1953.]

In experiments at the University of Massachusetts, Amherst, phygon XL improved the rooting of cuttings of woody plants [*R.A.M.*, 29, p. 605] particularly when applied at 0·3 or 0·6 gm. per l. water with diluted indolebutyric acid (0·3 or 0·8 per cent. 1:2, 1:3, or 1:4) or talc (1:2 or 1:4).

Robak (H.). **Om saprofyttiske og parasittiske raser af Lerkekreftsoppen, Dasyscypha willkommii (Hart.) Rehm.** [On saprophytic and parasitic races of the Larch canker fungus, *Dasyscypha willkommii* (Hart.) Rehm.]—*Medd. Vestland. forstl. Forsøkssta.* 29 (9, 2), pp. 117–211, 5 pl., 2 figs., 11 graphs (1 col.), 1952. [English summary on pp. 188–204.]

The author's exhaustive studies on the larch canker fungus (*Dasyscypha willkommii*), based on material from plantations in western Norway, led to the conclusion

(already briefly noted) [*R.A.M.*, 28, p. 322] that the saprophytic and parasitic races are morphologically and culturally distinct. In an addendum he does not agree with Dennis [ibid., 30, p. 1] or Seaver [ibid., 31, p. 461] in their elevation of the saprophyte to specific rank, for which the differences are regarded as insufficient. He considers that Seaver's *D. hahniana* for the saprophytic fungus should be denominated *D. willkommii* var. *hahniana*.

The following data suggest the implication of genetic factors in the interracial dissimilarities. The mycelia of the parasitic and saprophytic forms in malt and beer wort agar cultures were clearly distinguishable, the white aerial growth of the former being more compact and vigorous than that of the latter. The two types remained unchanged after at least a year on sterilized larch twigs, while on malt agar the differences were still apparent after 1½ to 2 ears' culture, or longer in some cases. On media containing 0·5 per cent. gallic or tannic acid the saprophytic strains generally secreted a brown pigment earlier and (during the first week) more copiously than the parasitic, and in the presence of tannic acid the growth rate of the former was significantly higher than that of the latter. On sterilized larch twigs the capacity for apothecial reproduction was weaker in the parasitic than in the saprophytic forms. Both mycelial types retained their distinctive morphological features on reisolation from bark which was living at the time of inoculation. The only two apothecia produced in these tests by a saprophytic mycelium on formerly sound bark were typical in all respects of the saprophytic form.

While not disproving the hereditary origin of the disparities between the two races, the following considerations are opposed to their specific differentiation. A high percentage of pointed spores, regarded by Hahn and Ayers [ibid., 23, p. 50] as a special feature of the apothecia of the parasitic strains, was also encountered in some of those from dead branches. In both types 'frequency of pointedness' increased parallel with spore dimensions. A fairly high proportion of 'saprophytic' apothecia were furnished exclusively with the regular, filiform paraphyses hitherto associated with the parasitic forms, while conversely, the paraphyses of several 'parasitic' apothecia were of the irregular type commonly believed to be peculiar to the saprophytic strains. The morphological variability of both the pointed 'parasitic' spores and the irregular 'saprophytic' paraphyses inclines the author to interpret them as anomalies induced by nutritional disturbances. Almost without exception the 'saprophytic' apothecia produced in cultures on sterilized larch twigs gave rise to regular 'parasitic' paraphyses, and some of them also to a high percentage of pointed spores. Several of the above-mentioned cultural characters are somewhat inconsistent.

As a practical application of these results it would appear that, in general, there is no reason to anticipate canker formation when apothecia are found on dead branches unless the latter were previously parasitized, in which case apothecia with potentially infective spores may develop on the original cankers (even if only incipient) several months after the death of the branches. Hence an abundant growth of apothecia on dead branches does not necessitate drastic thinning or the burning of refuse and clippings.

VAARTAJA (O.). **Forest humus quality and light conditions as factors influencing damping-off.**—*Phytopathology*, 42, 9, pp. 501–506, 1 graph, 1952.

In outdoor experiments in strong light at Yale University and the Institute of Phytopathology, Helsinki, pine (*Pinus sylvestris*) and birch (*Betula verrucosa*) seedlings suffered no appreciable damping-off on seed-beds of sand and humus from different forest types in the south of Finland. Under low illumination (about 400 ft.-candles) in the laboratory, the severity of the disease was dependent on the quality of the sites providing the humus, mortality on beds prepared from *Oxalis-*

Maianthemum or *Oxalis-Myrtillus* soils often reaching 100 per cent. Another factor influencing damping-off, if light intensity and temperature were low (10° to 15° C.), was the daily duration of illumination, especially with birch, seed of which sometimes died on all humus types in the shorter period of illumination (10 hours).

At least nine and probably more of the 17 fungi isolated from the seedlings (which also included larch and spruce) were shown by inoculation tests to be pathogenic, among them being species of *Alternaria*, *Fusarium*, *Hormodendrum*, and *Rhizoctonia* [cf. *R.A.M.*, 18, p. 561; 23, p. 50; 25, p. 19; 31, p. 640, *et passim*].

Böhner (F.). **Der Kieferndrehpilz, eine ernste Gefahr für Kiefernkulturen.** [The Pine twisting fungus, a serious threat to Pine stands.]—*Allg. Forstz.*, 7, 46, pp. 471–473, 7 figs., 1952.

An exceptionally severe outbreak of *Melampsora pinitorqua* in three- to ten-year-old pine stands in the Nuremberg Forest, Germany [*R.A.M.*, 8, p. 344], in 1951 prompted this account of the biology of the rust and its control. Besides attacking the shoots, *M. pinitorqua* paves the way for depredations of the leaf roller moth (*Tortrix*) and possibly contributes to certain growth disturbances such as abnormally prolific budding (12 instead of six buds at the tips of both leading and side shoots); formation of 'rosette' shoots, with short, erect needles, the central bud being almost uniformly abortive; and the production of so-called 'sheath buds' with marked hypertrophy of the needles. In an area comprising 16,500 trees, 1,880 (12 per cent.) showed recognizable symptoms of primary infection and 520 (3 per cent.) 'rosette' shoots, while the remainder were affected by one or other of the above-mentioned growth disturbances, or infested by insects, without external evidence of the rust. The direct control of *M. pinitorqua* seems, from the results of spraying experiments to date, to be impracticable, and the only feasible method is the removal of aspens [*Populus tremula*] (the alternate host) over a radius of at least 50 km. from the pine stands.

Mielke (J. L.). **The rust fungus Cronartium filamentosum in Rocky Mountain ponderosa Pine.**—*J. For.*, 50, 5, pp. 365–373, 3 figs., 1952.

Heavy infections on stands of *Pinus ponderosa* var. *scopulorum* by *Cronartium filamentosum* [*R.A.M.*, 31, p. 464; 32, p. 111] are reported from the Dixie National Forest and Bryce Canyon National Park, Utah. The rust has been reported on *Castilleja* spp., but was never found on them in the above-mentioned localities, although they occur in abundance there.

Spore production on ponderosa pine starts in late May or June, depending on the season and elevation, and continues throughout the summer, often into late autumn. The youngest infected trees found were about 30 years old and cross sections of those of over 3·6 in. d.b.h. showed an average of 11 and in some areas up to 25 per cent. infection. The average infection percentage for trees over 6 in. d.b.h. was about 18. Diameter growth of the pines with 50 per cent. or more of the crown killed, 80 to 90 per cent. resulting in the death of the entire tree, is sometimes greatly reduced but may be insignificant. The average annual rate of crown kill where the disease is travelling in one direction was estimated at 0·6 to 0·7 ft.

So far only silvicultural methods of control are known.

Fowler (M. E.). **Aircraft scouting for pole blight and Oak wilt.**—*J. For.*, 50, 3, pp. 191–195, 1 map, 1952.

Most of this information on pole blight [associated with *Leptographium* sp.: *R.A.M.*, 32, p. 350 and next abstract] of western white pine [*Pinus monticola*] and oak wilt [*Endoconidiophora fagacearum*: ibid., 31, p. 522, and above, p. 405] has already been noticed from other sources.

Hubert (E. E.) & Ferrell (W. K.). **Radioisotope tests of translocation in artificially infected Pinus monticola Dory.**—Abs. in *Phytopathology*, 42, 9, p. 515, 1952.

Symptoms of pole blight [see preceding abstract] are appearing on 60,000 acres of western white pine (*Pinus monticola*) in northern Idaho, western Montana, and British Columbia, and many trees are dying. As a part of the studies in progress on the etiology of the disease, radio-active phosphorus solutions are being introduced into the xylem and phloem to determine whether the bark lesions resulting from inoculation with certain fungi isolated from infected trees cause any changes in the translocation or absorption of the introduced solution. Some evidence from preliminary greenhouse tests with *Leptographium* sp. indicates that bark lesions on the trunk seriously obstruct the downward movement of P_{32} in the phloem.

Krampe (O.) & Rehm (H. J.). **Untersuchungen über den Befall von Pseudotsuga taxifolia viridis mit Adelopus gäumanni Rohde.** [Studies on the infection of *Pseudotsuga taxifolia viridis* by *Adelopus gäumanni* Rohde.]—*NachrBl. dtsch. PflSchDienst, Berl.*, 6, 11, pp. 208–212, 5 figs., 1952.

In the forest of the University of Greifswald, Mecklenburg, Germany, infection of the coastal (*viridis*) form of *Pseudotsuga taxifolia* by *Phaeocryptopus gaeumanni* [*R.A.M.*, 31, p. 534; 32, p. 350 and next abstracts] occurred principally in 12- to 15-year-old stands, the loss of needles being extensive and in some cases complete. Rohde's observations [ibid., 17, p. 494] that the fungus persists for several years in the needles of the mountain forms (*glauca* and *caesia*), producing new fructifications annually, was confirmed by the present studies on f. *viridis*. The few trees that had retained their needles were of two types, one characterized by great tolerance, the needles being just as densely covered with the fructifications as those of the denuded trees. The others were apparently in some degree resistant, since they bore only slight infection, mostly on the older needles. In these two groups the 1947 and 1948 needles were still green in the spring of 1952, whereas the 'normally' infected trees had lost even the 1949 needles. *P. gaeumanni* attacked the *viridis* form in the first year after germination and was prevalent on three- to four-year-old trees, which did not, however, shed their needles. Large, 51-year-old individuals also harboured the fungus without apparent damage. Wind is probably the chief agent of spore dissemination, but evidence is briefly adduced in support of the opinion that a species of Bibionid and other flies may also be implicated to some extent.

In the first and second years of infection the fruit bodies are mostly concentrated at the needle tips, but by the third year the base is covered with equal density, discoloration has spread from the tip, and the needles are shed. The hyphae pass through the stoma into the inner air chamber and branch profusely in the intercellular spaces, which appear to be the only part of the living leaf invaded. The mycelium is often present in the spongy parenchyma and between the palisade cells. After the death of the tissues the pathogen is also found within the cells. After overwintering in the needles the mycelium thickens in the inner air chamber, forming a dark plug below the guard cells from which the hyphae grow slowly through the stomatal pore into the outer chamber, where further thickening takes place, followed by fructification. Ripe spores were first observed on 23rd May and the main ejection occurred in mid-June.

Among the numerous micro-organisms obtained in pure culture from needles of 15-year-old *P. taxifolia* trees and suspected of causing secondary infection were species of *Fusarium* of the *Lateritium* group, *Botrytis cinerea*, *Dematium nigrum*, *D.* [*Pullularia*] *pullulans*, *Hormiscium pinophyllum*, *Alternaria* sp., and *Xylaria* sp.

B. cinerea [ibid., 32, p. 269] and *Xylaria* sp. were shown by experiments with culture filtrates to secrete toxins which induced wilting in *Pseudotsuga taxifolia*, and the former species, at any rate, may well be concerned in the etiology of needle-fall in the Greifswald forest.

The breeding of resistant varieties is the sole practicable method for the direct control of *Phaeocryptopus gaeumanni*, but the risk of infection may be minimized by cultivation of the host in mixed stands with other conifers (which appear to be immune) and hardwoods and the provision of favourable microclimatic conditions.

MERKLE (R.). **Über die Douglasien-Vorkommen und die Ausbreitung der Adelopus-Nadelschütte in Württemberg-Hohenzollern.** [On the occurrence of Douglas Firs and the distribution of the *Adelopus* needle-cast in Württemberg-Hohenzollern.]—*Forst- u. Jagdztg*, 122, 5, pp. 161–191, 20 figs., 10 graphs, 2 maps, 1951.

Douglas firs (*Pseudotsuga taxifolia*) cover 175 ha. in the Tübingen forest administrative area, Württemberg, Germany, 56 per cent. being in the 30- to 50-year-old age group. They are almost exclusively of the green (*viridis*) form, though with many gradations, especially in the Black Forest, towards the grey (*caesia*) and blue (*glauca*) mountain types. The needle-fall caused by *Phaeocryptopus gaeumanni* [see preceding and next abstracts] has been present in the province since 1931 and its rapid local extension resulted in 1940 in the prohibition of Douglas fir cultivation in Württemberg. The disease is, however, still prevalent and in places very severe, especially in 5- to 30-year-old stands, though some signs of recovery were observed between 1943 and 1949.

Favourable conditions for the development and spread of the pathogen are evidently provided by heavy summer precipitation and sites with high atmospheric humidity. The fungus seldom kills the trees or decimates whole stands, but it prepares the way for secondary invaders which complete the work of destruction. Prophylaxis should be based on the rehabilitation of diseased stands by silvicultural measures, such as thinning and trimming, and by the planting of carefully selected material on warm, dry sites.

MEYER (H.). **Die Verbreitung der Douglasienschütten. Zum Stand der Krankheitserforschung.** [The distribution of the Douglas Fir needle-cast. On the position of research into the disease.]—*Forstarch.*, 22, 1–2, pp. 5–11, 8 figs., 1951.

Information on the geographical distribution of the Douglas fir [*Pseudotsuga taxifolia*] parasites, *Rhabdocline pseudotsugae* [C.M.I. map No. 52] and *Phaeocryptopus gaeumanni* [ibid., No. 42], is presented and the effects of the two pathogens are compared in the light of observations at the Institute of Forest Botany of Göttingen University, Hann.-Münden, and elsewhere in Germany [see preceding abstracts]. Local investigations lent no support to the view that *P. gaeumanni* is less virulent in sparsely planted, sheltered, or mixed stands. Individual differences in susceptibility are attributable rather to internal characters derived from the random intermingling of heterogeneous races. *R. pseudotsugae* is the more dangerous of the two pathogens, since it destroys the needles within a year, whereas those attacked by *P. gaeumanni* often persist for a number of years.

According to statements received by the author *in litt.* during the years 1948–9, the destruction by *P. gaeumanni* in Denmark [*R.A.M.*, 32, p. 350] was greatly intensified by the rigorous winter of 1946–7, when enormous numbers of needles were shed. From Switzerland Burger and Gäumann report indications of spontaneous recovery in several stands of the green (*viridis*) form, four to six of the current year's shoots bearing needles as compared with only one or two of the blue (*glauca*) and grey (*caesia*) types, which were still suffering heavy damage.

The incidence of *R. pseudotsugae* was reduced in 1949 by two applications

(middle and end of May) of copper-lime. Thus, the percentage of infection in plots treated with Kupferkalk Hesta (15 per cent. copper) was 35·3 as against 91 in the untreated, the corresponding figures for Kupferkalk Wacker (18 per cent. copper) being 26·5 and 93, and for Kupferkalk OW 21 (45 per cent. copper) 39·3 and 98·1, respectively. However, the prevention of reinfection by this method does not appear to be feasible owing to the insufficient adhesion of the fungicides to the lower surfaces of the needles.

Eick (H. J.). **Rauchschäden.** [Smoke damage.]—*Allg. Forstz.*, 59, 1, pp. 32–33, 3 figs., 1953.

Since 1912 the spruce trees constituting 74 per cent. of the stand in a private forest covering 400 to 500 ha. on the fringe of the Ruhr Valley, Germany, have been dying off from the effects of fumes (chiefly sulphuric acid) emitted by a neighbouring cellulose factory [see above, p. 394]. The needles gradually turn brown all over, starting from the tip. The sulphuric acid also permeates the soil, where it converts the available lime into calcium sulphate. Special precautions to minimize the damage have been adopted by the manufacturers; alleviation measures should consist in the establishment of mixed stands and the introduction of smoke-resistant species, such as *Picea pungens* and *P. sitchensis*.

Imazeki (R.) & Aoshima (K.). **Further information on two or three wood-decaying fungi.**—*Ann. phytopath. Soc. Japan*, 16, 2, p. 88, 1952. [Japanese.]

Cryptoderma nigrolimitatum (Romell) Imazeki & Aoshima, n. comb. [*Fomes nigrolimitatus*] was found on a felled trunk of *Picea jezoensis* var. *hondaensis* in the mountainous region of central Japan. The decay is a typical white rot, simulating that due to *Trametes* [*Fomes*] *pini*, though more extensive; the surface of the sporophore is more hairy and there are no swollen-type hyphae.

Forest research in India, 1948-49. Part. I. The Forest Research Institute.—Dehra Dun, 111 pp., 1952.

In the Botany Branch report (pp. 4–5, 41–45) [cf. *R.A.M.*, 28, p. 147] M. B. Raizada states that the sal [*Shorea robusta*] 'gauj' disease (*Fomes caryophylli*) [ibid., 32, p. 158], previously associated with frost, has now been observed in areas where frost has never been recorded. As a result, the sal disease survey is now extended to the southernmost limit. K. Bagchee reports records of *F. caryophylli* on *Anogeissus latifolia*, *Cleistanthus collinus*, *Eugenia jambolana*, and *Madhuca latifolia*. *Trametes meyenii* [ibid., 10, p. 635] is a new record on sal. D. Narayanamurti reports from the Wood Preservation Branch (p. 65) that in toxicity tests with phenyl-mercury-fixtan and hardi-proof (copper naphthenate), using *Polystictus sanguineus* [ibid., 28, p. 147; 32, pp. 157, 351] as the test fungus, the toxic limit for the former was between 0·04 and 0·07 lb. per cu. ft. and for the latter less than 0·15 lb. per cu. ft.

Blew (J. O) & Champion (F. J.). **Preservative treatment of fence posts and farm timbers.**—*Fmrs' Bull. U.S. Dep. Agric.* 2049, 33 pp., 6 figs., 2 diags., 1 graph, 1952. [Received April, 1953.]

This bulletin supersedes *Fmrs' Bull.* 744, entitled 'The preservative treatment of farm timbers', and deals with the various preservatives and treatment methods [see next abstract].

Maclean (J. D.). **Preservative treatment of wood by pressure methods.**—*Agric. Handb. U.S. Dep. Agric.* 40, iv+160 pp., 7 figs., 41 graphs, 1952. [Received April, 1953.]

This technical handbook, which supersedes *Misc. Publ.* 224 [*R.A.M.*, 15, p.

269], contains much new material, including an appendix dealing with symbols used in formulae relating to physical properties of wood, and the formulae themselves, methods of using figures when finding temperatures to be expected in timbers heated under any given conditions, adjustment for different heating-medium temperatures, temperatures in round and sawn timbers, and symbols and formulae relating to temperature change in wood. The list of works cited in the text comprises 65 titles.

Linnasalmi (Annikki). **Damping-off on herbaceous vegetables and ornamental plants grown under glass in Finland.**—*Ann.* (*bot.-zool.*) *Soc. zool.-bot. fenn. Vanamo*, Sect. bot., 26, 1, pp. 1–120, 22 figs., 10 graphs, 1 map, 1952. [Finnish summary.]

This is a comprehensive, fully tabulated account of the author's studies at the Department of Plant Pathology, Tikkurila, Finland, on the etiology, distribution, and economic importance of damping-off in vegetables and ornamentals grown under glass, supplemented by a survey of the literature, listed in an eight-page bibliography.

About three-quarters of the gardens in all parts of the country were affected, the percentage of infection being commonly well below 40 but rising occasionally to between 90 and 100. The following were found to be responsible, all except *Pythium debaryanum* for the first time in Finland: *Rhizoctonia* [*Corticium*] *solani* (62 per cent.), *P. debaryanum* and *P. ultimum* [C.M.I. map No. 207] (mostly the former) 24, and a total of 14 per cent. represented by *Alternaria brassicicola*, *Stemphylium consortiale* [*R.A.M.*, 31, p. 244] (both new to the country), *Botrytis cinerea*, *Fusarium avenaceum*, *F. chlamydosporum*, and *F. conglutinans* var. *callistephi* (all three new to Finland), *F. culmorum*, and *F. solani* with its var. *minus*, the last-named also new. Species of 19 genera were attacked, among the hosts of *C. solani* being cauliflower, cabbage, swede, *Matthiola incana*, carnation, China aster, and *Begonia* sp.; of *P. debaryanum* the first four mentioned above, tomato, tobacco, cucumber, red beet, and sweet pea; of *P. ultimum* cauliflower, cabbage, tomato, cucumber, and sugar beet; of *A. brassicicola* cauliflower, cabbage, and China aster; of *S. consortiale* cauliflower; of *F. avenaceum* cauliflower and *M. incana*; of *F. chlamydosporum* tomato and carnation; of *F. conglutinans* var. *callistephi* China aster; of *F. culmorum* cabbage; of *F. solani* cabbage, *M. incana*, and carnation; of *F. solani* var. *minus* cabbage; and of *B. cinerea* cabbage, cauliflower, and China aster. In general, cauliflower was the most susceptible and tomato the least so, while the reactions of cabbage and cucumber were intermediate. About half the loss from *C. solani* occurred during the pre-emergence phase, to which *Fusarium* damping-off was almost entirely restricted. On the other hand, *Pythium* spp., *A. brassicicola*, and *S. consortiale* chiefly infected emerged seedlings and *B. cinerea* did so exclusively. In 87 per cent. of the garden soils analysed the pH ranged from 6 to 7, the minimum and maximum values of the remainder being 4·9 and 8·4, respectively. However, the disease was not influenced by variations in soil reaction.

Control experiments were performed on cabbage in heat-sterilized soil inoculated with *C. solani* and *P. debaryanum*. Both pathogens were completely or almost completely destroyed by one hour's steaming at 120° C. or baking at 100°, as well as by soil treatment with arasan (at 50 gm. per sq. m.), semesan (75 gm.), chloropicrin at 65 ml. per sq. m. mixed with absolute ethanol (1:1), and formalin at 2·5 dl. per sq. m. mixed with water (1:2 to 20). Arasan should be applied one to five days, semesan three to five, and formalin a fortnight to three weeks before sowing. Other effective but phytotoxic preparations were ceresan-liquid (75 gm.), mercuric chloride (4 gm.), and salicylic acid (200 gm.). The damage from *P. debaryanum* was considerably reduced by a soil treatment three days before sowing with 80 per

cent. acetic acid at 22 ml. per sq. m. or zinc oxide (110 gm.), the latter compound also being applicable to the seed. None of the 14 seed disinfectants tested [cf. ibid., 32, p. 352] was effective against *C. solani*, but quasi-complete protection from *P. debaryanum* was conferred by excess dosages of arasan, täyssato [ibid., 31, p. 108], dithane Z-78, and phygon. Aagrano [ibid., 32, p. 14] and perenox were almost equally efficacious, but the latter was slightly phytotoxic. Seed treatment, however, cannot be recommended for damping-off control in Finland, where *C. solani* [ibid., 32, p. 277] is so much more widespread than *P. debaryanum*. A combination of physical and chemical soil disinfection methods is more likely to prove successful.

Miller (H. J.). **Control of damping-off fungi with substituted nitrobenzenes.**—Abs. in *Phytopathology*, 42, 9, p. 470, 1952.

Pea seed treatment with 2,4-dinitrofluorobenzene at a dosage of 0·25 per cent. by weight of seed of a 10 per cent. active powder formulation in greenhouse soil heavily infested with [unspecified] damping-off fungi [*R.A.M.*, 31, p. 365; 32, p. 56] resulted in emergence equal to that obtained with standard chemicals. Some of the untreated pea seeds in the same soil failed to emerge at all. Applications of the compound at 10 to 20 lb. per acre as a spray emulsion or wettable powder gave up to 70 per cent. seedling emergence compared with only 22 from the untreated areas. No injury was observed on seed sown before or from two to eight days after the soil treatment.

Control of cotton seedling anthracnose [*Glomerella gossypii*] with a dosage of 0·15 per cent. by weight of a powder containing 10 per cent. 2,4-dinitrofluorobenzene was equal to that secured by other standard methods.

Bain (D. C.). **Reaction of Brassica seedlings to blackrot.**—*Phytopathology*, 42, 9, pp. 497–500, 1952.

At the Truck Crops Branch Experiment Station, Crystal Springs, Mississippi, the reaction of *Brassica* seedlings (including a large number of commercial cabbage varieties and strains) to black rot [*Xanthomonas campestris*: *R.A.M.*, 32, p. 172] was ascertained by determining the percentages of diseased plants arising from inoculated seed [ibid., 31, p. 96]. Turnip, black mustard, rape, and *B.* spp. (mostly mustards) were in the low-percentage infection group (less than 33), cauliflower, broccoli, swede, collard, kale, Brussels sprouts, and kohlrabi in the high (over 55), and cabbage intermediate (41) [cf. ibid., 10, p. 151; 28, p. 555]. Selfed selections from surviving healthy cabbage seedlings were markedly resistant in comparison with plants from commercial seed. From the results of these extensive trials cabbage and, possibly, related species appear to carry one or more factors for resistance to *X. campestris* which it might be possible to select out of certain commercial varieties.

Jones (W.). **An unreported Phytophthora rot of Swede Turnips.**—Abs. in *Phytopathology*, 42, 9, p. 515, 1952.

Stored swedes in British Columbia were affected during the winters of 1951 and 1952 by a species of *Phytophthora* resembling *P. megasperma* [C.M.I. map No. 157] in its morphological characters and growth temperature. A typical external symptom was a 'washing out' of the normal purplish colour, the diseased flesh being greyish, soft, and resilient, exuding a clear liquid on pressure. The fungus was pathogenic to seedlings of turnip, swede (four varieties), cauliflower [*R.A.M.*, 15, p. 188], and cabbage [loc. cit.], as well as to carrot and potato [ibid., 12, p. 466]. The optimum temperature for its growth is about 25° C., the minimum just below 5°, and the maximum approximately 30°. Observations made within three days of placing sections of cellophane cultures in distilled water showed the optimum temperatures for the production of sporangia and organs of

fusion to be 20° and 24°, respectively. Neither developed at 5°, 10°, or 30° and only organs of fusion at 24°.

Dunleavy (J. M.). **Control of damping-off of Sugar Beet by Bacillus subtilis.**—Abs. in *Phytopathology*, 42, 9, p. 465, 1952.

Bacillus subtilis, isolated from soil in eastern Nebraska, showed considerable antagonism to a species of *Rhizoctonia* which causes severe damping-off of sugar beet in the same locality. Suspensions from centrifuged and autoclaved cultures of the bacterium, added to nutrient agar, strongly inhibited the growth of the fungus. In greenhouse tests living bacteria were introduced into sterile soil, to which the fungus was added after seven days, prior to planting with sugar beets. This treatment resulted in a marked decrease of damping-off in comparison with bacteria-free soil.

Hildebrand (A. A.) & McKeen (W. E.). **Field results in 1949 following row treatment of soil with tetramethyl thiram disulphide for control of blackroot of Sugar Beet seedlings.**—*Proc. Amer. Soc. Sug. Beet Tech., 1950*, pp. 515–518, [? 1951. Received 1952.]

In field tests in south-western Ontario, in which formulations of thiram mixed with standard commercial fertilizer were added to field soils with a recent history of sugar beet black root [primarily *Aphanomyces cochlioides*: *R.A.M.*, 29, p. 283; 32, p. 355], the yield of mature beets was 13·4 tons per acre when 4·3 lb. arasan was added to 432 lb. 2–12–6 fertilizer, 9·52 tons when it was added to 218 lb. fertilizer, as against 12·62 and 9·16 tons for the two fertilizer doses alone, 9·04 tons for 388 lb. 2–16–6 fertilizer alone, and 11·24 tons for the same plus 2·6 lb. D-419; 8·26 tons for 324 lb. 2–16–6 fertilizer alone and 9·81 tons for the same plus 3·2 lb. D-419; and 7·9 tons for 302 lb. 2–16–6 fertilizer alone and 11·3 tons for the same plus 4 lb. D-419, the last treatment giving an increased yield of 43·4 per cent.

McLean (D. M.). **Tests for the occurrence of virus yellows in table Beet seed plants in northwestern Washington.**—Abs. in *Phytopathology*, 42, 9, p. 516, 1952.

In north-western Washington the older leaves of red beet stecklings planted for seed production develop yellows symptoms [*R.A.M.*, 32, p. 228] in June or July. The symptoms were transmitted by green peach [-potato] aphids [*Myzus persicae*] to Detroit Dark Red beet seedlings. Serum tests by G. H. Coons [loc. cit.] indicated the presence of a mild yellowing virus which is thought to be closely related to European yellows virus.

Domínguez García-Tejero (F.). **Distribución en España de las plagas y enfermedades de la Remolacha.** [The distribution in Spain of the pests and diseases of Beet.]—*Bol. Pat. veg. Ent. agríc., Madr.*, 18 (*1950*), pp. 181–204, 21 figs., 1 map, 1951. [Received 1953.]

The distribution is given of the diseases of beet in Spain, the most important being leaf spot caused by *Cercospora beticola* [C.M.I. map No. 96] which reduces yields in the Aragon plains, and violet root rot (*Rhizoctonia violacea* var. *betae*) [*Helicobasidium purpureum*: *R.A.M.*, 23, p. 354], particularly damaging in humid areas. Minor diseases are bacterial gummosis (*Bacillus betae*) [ibid., 29, p. 343] and those caused by *Clasterosporium putrefaciens* [ibid., 31, p. 536], *Fusarium* sp. [ibid., 29, p. 240], *Macrosporium cladosporioides* [ibid., 22, p. 123; 27, p. 402], *Microsphaera betae* [ibid., 8, p. 152], *Oospora* sp. [ibid., 10, pp. 152, 425], *Peronospora schachtii* [C.M.I. map No. 28], *Phyllosticta betae* [*R.A.M.*, 8, p. 152], *Sclerotium rolfsii* [ibid., 30, p. 447], *Uromyces betae* [C.M.I. map No. 265], and *Verticillium* sp. [*R.A.M.*, 26, p. 179].

Cruickshank (I. A. M.). **Fungous diseases of Peas in New Zealand.**—*Rep. Sci. Congr. roy. Soc. N.Z., 1951*, pp. 52–54, 1952.

Notes are given on the symptoms and control of and varietal resistance to the two chief diseases of peas in New Zealand, viz., collar rot (*Ascochyta pisi*, *A. pinodella*, and *Mycosphaerella pinodes* [cf. *R.A.M.*, 30, p. 91; 31, p. 3]) and wilt (*Fusarium orthoceras* var. *pisi*) [ibid., 32, p. 114].

Srinivasan (K. V.). **Isariopsis griseola Sacc. on Phaseolus vulgaris L.**—*Curr. Sci.*, 22, 1, p. 20, 1953.

The causal organism of a leaf spot disease prevalent on French beans (*Phaseolus vulgaris*) during and after the rains in various parts of the Nilgiri plateau, India, was found to be *Isariopsis griseola* [*R.A.M.*, 31, p. 476], a new record for India. In pathogenicity tests typical lesions developed on the leaves 12 days after inoculation with the conidial suspension. Black Valentine and Bountiful Yellow varieties as well as the local French bean were all equally susceptible.

Cosper (H.) & Schuster (M. L.). **Effect of urea on the incidence of Bean rust.**—*Agron J.*, 45, 2, pp. 74–75, 1 fig., 1953.

An account is given of controlled greenhouse and laboratory trials at the Nebraska Agricultural Experiment Station to test the accuracy of incidental field observations in 1950 and 1951 at the Scotts Bluff Substation on a decrease in virulence of bean [*Phaseolus vulgaris*] rust (*Uromyces phaseoli typica*) [*U. appendiculatus*: *R.A.M.*, 32, p. 230] due to spraying with urea as a nitrogen fertilizer. The thrice replicated treatments comprised spraying with urea at 1 per cent., dreft (sodium lauryl sulphate) [ibid., 29, p. 563] at 200 p.p.m., or a combination of the two, and dusting with undiluted sulphur. Inoculation was effected shortly afterwards by shaking rusted bean plants over the treated ones, the primary leaves of which were about half grown and the first trifoliates not yet unfolded. The plants were then kept in a humidity chamber for 12 hours.

The average numbers of pustules per leaf of the treated plants compared with 231 on the controls (sprayed with tap water) were as follows: urea 67, dreft 57, urea-dreft 32, and sulphur 0·3. The incorporation of 3 per cent. urea with 1 per cent. water agar totally inhibited uredospore germination thereon; at 1 and 2 per cent. few spores germinated (maximum of 15 as against 98 untreated) and the germ-tubes were shortened (maximum length 78 μ, untreated 254 μ). In later tests dreft and urea, singly or combined, similarly reduced spore germination.

Johnson (J. C.). **Common Bean mosaic yield trial, 1952.**—*Qd agric. J.*, 75, 6, pp. 350–352, 2 figs., 1952.

In a test carried out at the Redlands Experiment Station, Queensland, the effect of bean mosaic virus [cf. *R.A.M.*, 13, p. 488; 32, p. 229] on two susceptible strains (15 and 28) of Brown Beauty [*Phaseolus vulgaris*: ibid., 27, p. 591; 32, p. 175] was compared with that on strain 17, a recent selection made by the Horticultural Branch and found in glasshouse trials to be immune from the disease. Single plant progenies (pure lines) were used to obtain more uniform responses. The seed was sown in March to minimize cross-infection by aphid vectors but some contamination of the uninoculated plots occurred towards the end of the period. Half the total number of plots of each strain was artificially infected in the field by rubbing a mixture of infected bean sap and carborundum powder on to both primary leaves as soon as they had unfolded. This treatment gave 100 per cent. infection of susceptible plants, which became apparent six days after inoculation. Symptoms were conspicuous and continued to increase in severity for 10 to 15 days after infection, though the uninoculated rows were very vigorous. From then on until harvesting, however, the difference between infected and healthy plots

gradually diminished until they became indistinguishable from each other. Yield reductions for strain 15 were 14·8 and 7·9 per cent. in the first and total pickings, respectively, the corresponding figures for strain 28 being 15·1 and 9·5 per cent. Strain 17 was completely uninfected at the end of the experiment and there was no yield reduction, the total picking being 106·5 oz. per plot for the inoculated plants and 105·9 for the uninoculated.

KENDRICK (J. B.) & ALLARD (R. W.). **A root rot tolerant Lima Bean.**—Abs. in *Phytopathology*, 42, 9, p. 515, 1952.

During the past four years varieties and breeding stock selections of Lima bean [*Phaseolus lunatus*] have been tested for their relative susceptibility to root rot, due principally to *Rhizoctonia* [*Corticium*] *solani* and *Fusarium solani* f. *phaseoli*, in the south coastal plain of California, where losses from the disease are heavy [*R.A.M.*, 29, p. 243]. One of the selections, L-4, has proved exceptionally tolerant, fungal invasion of the root being largely superficial and not extending appreciably into the hypocotyl. Lines from single-plant selections of L-4 differ to some extent in their reaction to root rot, indicating a measure of heterozygosity for tolerance. The bean is a calico type with irregular, red splotches on a white background. The selection is at present in use in a breeding programme designed to transfer its tolerance of root rot to the more susceptible green processing varieties of *P. lunatus*.

HARTWIG (E. E.) & JOHNSON (H. W.). **Effect of the bacterial pustule disease on yield and chemical composition of Soybeans.**—*Agron. J.*, 45, 1, pp. 22–23, 1953.

At Stoneville, Missouri, and Willard, North Carolina, comparisons were made in 1949 between 18 advanced F_6 lines of soy-beans resistant to bacterial pustule disease (*Xanthomonas phaseoli* var. *sojensis*) [*R.A.M.*, 31, p. 163; 32, p. 166] and 18 similar susceptible ones. The latter developed moderate but uniform infection at both places, yielding 11 per cent. less than the resistant at Stoneville and 8 per cent. less at Willard. However, the seed size of the susceptible lines was only 3 and 4 per cent. smaller at the two places, respectively, than that of the resistant. The difference between the resistant and susceptible lines for seed yield and size was significant at the 1 per cent. level at both locations. In order to account for the yield reduction of the susceptible lines, a reduction in seed number as well as dimensions must be postulated. The protein content of the resistant lines was higher than that of the susceptible, while the iodine number of the oil of the latter significantly exceeded that of the former at Stoneville.

RØED (H.). **Botryotinia porri (Beyma thoe Kingma) Whetz. on Allium porrum in Norway.**—*Acta Agric. scand.*, 2, 3, pp. 232–241, 1 fig., 1952.

The *Botrytis* infections of leek occasionally recorded in Norway have hitherto been regarded as the ordinary form of *B. cinerea*, but in a closer study from 1944 to 1946 the author induced the development of the perfect state, which is referred to *Botryotinia* [*Sclerotinia*] *porri* [cf. *R.A.M.*, 25, p. 235], in three out of four cultures on malt agar by a method already described [ibid., 29, p. 564]. The connexion between the two states was demonstrated by comparative observations on their morphology, growth rates, and cultural characters.

Inoculation experiments performed on onions to test Cronshey's report that *S. porri* may be the cause of severe neck rot [ibid., 27, p. 170] showed that the uninjured thin outer scales provided protection against infection, whereas the incised and the peeled onions developed a watery brownish rot. The fungus was also pathogenic to leeks. A certain similarity was noted, moreover, between *S. porri* and *Botrytis byssoidea* [ibid., 30, p. 301] in respect of conidial dimensions and pathogenicity to onion, but it was not sufficiently close to justify Cronshey's assumption that the former is the perfect state of the latter.